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THE most important event of the day, so far as the general interests of architecture are concerned, is doubtless the assembling of the International Congress of Architects at Paris. The business of the Congress seems to have been managed in a manner very different from the more democratic and parliamentary methods to which we are accustomed. There was no form of electing officers, no delay in effecting an organization, no appointing of committees, no visible machinery, excepting that exhibited in the indefatigable energy of M. Charles Lucas, the secretary of the Société Centrale, who was the impelling force, and in the dignity of M. Lefuel, president of the Société Centrale, who was the decorative head and front of the proceedings. The programme of the Congress embraced two daily sessions, one in the morning at the Tuileries, devoted to the reading of papers, and one in the afternoon at the Palace of the Trocadéro, devoted to discussions. The proceedings occupied six days. On the first day (July 29th), after a brief introductory address by the president, the Congress was opened by the delivery of an essay by M. Hermant, vice-president of the Société Centrale, on "Natural Æsthetics," in which he endeavored to prove that, as the comprehension of the beautiful is a faculty common in a greater or less degree to all mankind, the ideal civilization requires a system of common education which shall be devoted more directly than hitherto to the development and cultivation of this faculty. The second day was given up mainly to speeches and discussions by members of various nationalities on the position of the architect as a professional man; the third to the consideration of the subjects of "Architects' Charges" and "Workmen and their Organization;" the fourth to a visit to Rheims; and the fifth to discussions on Public Competitions. The sixth and last day was occupied by the distribution of medals of honor awarded by the Société Centrale, these being in four classes: the first given to architects for the best series of works for five years, the second to students for the best series of designs, the third to contractors and skilled workmen for conspicuous qualities in their departments, and the fourth to manufacturers of special decorative materials for architectural purposes. The Congress terminated in the evening with a grand banquet and concert. The attendance was very large, and architects were present from every civilized nation of the world excepting the United States. The peculiar interest of the occasion was of course in the participation by architects of many nations in discussions of important professional topics, rather than in the resolutions which were passed by the Congress, which, from the nature of the case, were on the whole rather colorless and conventional in character. It is to be hoped that on the next similar occasion American architects will not again be conspicuous by their absence.

THE discussion on the professional position of the architect turned mainly on the question as to the practicability of creating and maintaining a higher professional standard by the establishment of some system of diplomas. The testimony of the French architects upon this point was apparently without exception favorable to the compulsory exclusion of all who should fail to earn and hold such a diploma; at the same time architects from Denmark and Russia maintained that the establishment of a system of exclusion by diplomas, as practised in those countries, had not been productive of any especial advantage to the profession. On the part of England, Mr. R. P. Spiers explained that the present development of architecture in that country had been practically accomplished without the assistance of schools or diplomas, tuition being obtained by a system of apprenticeship in offices, imperfectly supplemented by evening classes, lectures, and schools, established mainly by the Royal Academy and by the Architectural Association, but a very small proportion — not more than twenty or thirty per cent. — of the students availing themselves of such means of completing their education. In the absence of academic discipline fortified by examinations and certificates of proficiency, as on the Continent, English art had been particularly sensitive to influence from literature; and the works of Scott and Thackeray, Pugin and Ruskin, Stuart and Revett, had largely assisted in creating a succession of historical revivals. But this freedom from conventional restraint had developed such marked architectural individualities as Barry, Scott, Cockerell, Street, Burges, and others too numerous to mention, each being the leader of a school contrasting with the rest in many essential particulars. Mr. Spiers then endeavored to explain the cause of the contemporary "Queen Anne" revival, and neatly expressed his conviction that a purer style would soon prevail, and that the works of Duc, Duban, Labrouste, and Vaudoyer would be accepted as models by the English architects. The resolutions following upon this discussion called upon the French societies to unite as far as possible with foreign societies in studying and deciding the question relating to the giving of diplomas to architects.

THE most interesting point developed in the discussion of the third day, on architects' charges, was the fact that the five per cent commission in France includes not only the items usually accepted in English and American practice, but also the computation of quantities; and it further appeared that the French architect, unlike the English, but like the American, is accustomed by preference to employ different contractors for the different departments of the building. The French percentage, according to the scale of charges fixed by the Council of Public Buildings, is divided as follows: "Drawings of every kind, 1½ per cent; superintendence of work, 1½ per cent; quantities and specifications, two per cent; making a total of five per cent" The German scale of charges, as set before the meeting, varies, according to the nature of the building to be executed, from three per cent to seven per cent. This scale has been adopted by the Belgian Architectural Society and by that of Marseilles. This arrangement, however, was condemned as dangerous, and as leading eventually to legal complications, a result which the establishment of a scale of charges is intended to avoid. After an animated discussion, carried by adjournments through three sittings, the Congress, not unanimously however, arrived at the following extraordinary resolution: "This Congress, recognizing the principle of the liberty of artistic work and its free remuneration, of which the foundation should be based on the *economical principle of supply and demand*, considers that each architect has the right to adjust the value of his services according to his own estimate of what would be a just recompense for his talent, taking into account the special difficulties which may arise in each case." This resolution is doubtless based upon abstract justice, but, owing to the imperfection of human nature, it would obviously remove from the practice of the profession its only protection against the worst evils of a competition of prices. It is true that this protection, as at present devised, is clumsy and apt to work gross injustice in especial cases, but it is the best we have, and, under the circumstances, should have been amended in its details rather than entirely abolished. This view of the

case, it seems, was practically recognized in a supplementary resolution, suggesting that in the absence of any preliminary arrangement the French scale of charges as above quoted "might be taken as a minimum, steps being taken meanwhile to ameliorate this document and augment the scale in consequence of diminution in the value of money."

On the fifth day of the International Congress the regular business related to public competitions, and the debate was on the following resolutions: "First. That the Minister of Public Works be requested to recognize the system of public competitions throughout France, and to place them on a basis which would give satisfaction to the interests of artists, the common welfare, and the requirements of state administration. Second, That the basis should consist of a series of rules defining the establishment of a programme and the nomination of a jury consisting of architects, instead of leaving the selection and judgment to the prefects and mayors." The English delegate considered the last provision inexpedient, and laid before the meeting the programme of the Royal Institute of British Architects, in which the utmost demanded is the appointment of an architectural assessor to draw up the programme in each case and advise as to the choice. The Russian delegate advocated the resolutions, and contended that the competitors should be allowed to appear before the architectural jury to "explain their own designs and criticise the others." The delegates from Madrid and Copenhagen complained of the irregularities in public competitions in their own countries and of the usual incompetence of the judges. The resolution was passed, and a committee, one third of which is to consist of four foreign delegates, — Russian, Spanish, Danish, and English, — was appointed to consider the subject. The American delegate, if present and well posted in the picturesque incidents of competitions in our own country, might have supplemented the evidence of his brethren from Madrid and Copenhagen, and added a chapter of experience undreamt of even in their philosophies.

Not many years back the fever-plague that is now desolating parts of the South would have been accepted as an inevitable occurrence; but now, when the laws of hygiene are better understood, it is easy to see that yellow fever, being probably a filth disease, is a preventable one. That it is a filth disease is shown by the circumstance which, we believe, gave rise to the yellow fever at New Berne during our late civil war. Certain officers there encamped, desiring to have a flower-garden in front of their quarters, had the soil turned up and seeds planted. Unfortunately the soil had been polluted by the slops from a regimental camp kitchen which formerly had been established there, and no sooner was the soil disturbed than yellow fever declared itself. This being the case, there are cities and towns in the South which are rapidly preparing themselves to be hospitable entertainers of the dread disease. The citizens of Baltimore for instance, in many cases still drink water from unclosed wells, no one of which, say the sanitary authorities, is free from sewage contamination. How could they be otherwise in a city where, until within a few years, there was but a half mile of sewer, and this only for rain-water; where all sewage was stored in cesspools, a large proportion of them made only of wood, so large, too, as rarely to cry for emptying; and where all the kitchen slops and bath waste are discharged over the sidewalks into open gutters, through which they sluggishly flow until they discharge themselves into the Basin, a pool almost in the heart of the city, where the tidal variation is but slight, and whence arises, as we remember it, a most noisome stench, even in the winter time? Up to this time Baltimore owes its exemption not to sanitary precaution, but to the tremendous thunder-storms, which occur so frequently during hot weather as to keep streets and gutters fairly clean. Complaints are heard, even now, from Philadelphia, where the odor arising through the openings into the sewers at the curbstone level is making itself a dreaded nuisance. Charleston, on the other hand, of all Southern cities, is said to be least afflicted during yellow fever epidemics, thanks to a system of sewerage said to be exceptionally good.

The story of the sorely stricken little town of Grenada in Mississippi is just what one would expect, and the deaths, plundering, and negro license and violence are but the just results of culpable neglect of the common laws of hygiene. It is sought to account for the first case of the fever in this town of twenty-two hundred inhabitants by the fact that the lady who was the first victim had just received and worn a new dress made in New Orleans, where the disease was already developed. As the manner in which the disease is propagated is not yet understood with absolute certainty, we cannot say that this was not the case, but circumstances were such that fever may easily have had its inception in the town itself. The sewer of the town, such as it is, is said to be merely a ditch sunk a few feet below the surface and covered ostensibly with planks, which are overspread more or less thinly with earth. Into this practically open drain is discharged the overflow of most of the cesspools and privies of the town, including those of several hotels and a female seminary, as well as the drainage from barns and from a large livery stable. The existence of the drain is ever asserted by the odors which arise from it, and these do not lose in strength whenever a pig, the only scavenger of some Southern towns, chancing in search of food to wander into it through some opening, gets wedged in and thus perishes miserably. Early in July the smell from the sewer had become such a nuisance that it was opened, and it is said that the carcasses of several hogs were found in it. The dress from New Orleans may have introduced the fever, but it should be noted that the lady who died on the 25th of July, while the sewer was still open, lived only a short distance from this freshly-opened drain, and that the fever, once introduced, followed with particular malignancy the course of this sewer, the cases being more frequent here than elsewhere, and resulting fatally within shorter periods. In the face of such statements as these it seems hardly necessary to search curiously for extraordinary causes.

A private citizen, a naturalized alien moreover, has been able to accomplish in Philadelphia a reform which one would think a governing body would be eager to initiate and carry into execution without waiting for a bribe of any form. Stephen Girard, to whom Philadelphia owes much, left a bequest of five hundred thousand dollars, which was to be applied first to opening Delaware Avenue, then to widening Water Street, and lastly to purchasing all the wooden buildings in the city with a view to their abolishment. To the State of Pennsylvania he bequeathed three hundred thousand dollars for canal improvements, with the condition that the Councils of Philadelphia should be authorized to prohibit the construction of any more wooden buildings in that city. This condition was acceded to, and since, in 1836, the Councils passed the prescribed ordinance, no wooden buildings have been erected in the city. Delaware Avenue has been opened and Water Street has been widened, yet the original bequest remains intact, for the managers of the Girard Trust have effected these improvements out of the interest accruing from the bequest. Now they are prepared to execute the third commission of the bequest, and have informed the six hundred owners of wooden buildings in the city that they stand ready to buy their old tenements at a fair appraisement. Some owners have been only too glad to come to terms, and are now rebuilding in brick. Others, seeking to obtain a price out of all proportion to the value of the building to be destroyed, have refused to sell, and as, unfortunately, there is no law which empowers the managers to force a sale, operations are brought to a stand in some directions. But the change must be effected in time, and the obstructive owners are only dallying with the inevitable. If in the future Philadelphia escapes conflagrations as disastrous as those which have twice swept over Chicago, she will owe it, even more than to her wide streets, to the shrewd foresight of Stephen Girard, and his strong common sense and mercantile instinct in perceiving that even when dealing with bodies politic it is best to have a *quid pro quo*. It is interesting on the other hand to note that Chicago, in spite of the severity of her lessons, does not yet "dread the fire," but has been considering lately the advisability of contracting her fire-limits.

The Board of Aldermen of the city of New York has voted to sustain the Comptroller in his refusal to contribute any more money towards the completion of the great East River Bridge, connecting the cities of New York and Brooklyn. This important action of the city government is based upon the facts that the limit of expenditure ($5,000,000), as established by law, has already been exceeded; that the city has already contributed $3,500,000, which is more than her legal quota; that the structure, if completed, will destroy fifty per cent of the value of the ferry franchise, one of the most important held by

the city, and one for the interference with which no compensation has been provided, or will be made; that it is and will be a serious obstruction to the navigation of the East River; that, because of such obstruction, the United States authorities may at any time order the removal of the bridge (indeed, a suit to that end is even now pending); and finally that the safety of the structure is gravely questioned by competent authority. It seems probable that the work on the bridge will not be resumed until the questions as to the liability of the city and the obstruction to navigation shall have been finally decided, and until the exact amount required to finish the work shall have been ascertained and its safety assured. According to the present aspect of affairs, therefore, this looks like an indefinite postponement of the whole enterprise, and meanwhile the stranger from beyond the seas, as he approaches the metropolis, will have pointed out to him the mighty towers of the bridge, with their unfinished slender threads of connection and their incomplete approaches, and will begin his notes on America with some pertinent reflections on the precipitancy of the national character and our tendency to undertake great works without duly counting the cost; a first impression, we regret to say, not likely to be weakened by subsequent observations and wider experience.

THE proposition to begin the long-considered work of decorating the interior of the Cathedral of St. Paul's by a costly experiment in the dome, as we have already explained in this journal (see *American Architect* for August 10th), meets with a vigorous opposition in many of the English papers. This opposition is directed not only against the great cost of the undertaking as compared with the results to be obtained, but against any effort which might tend to make a mere show-house of the great temple. But the criticisms which more immediately concern us, as architects, are those which take exception to the manner in which it is proposed to carry out this monumental enterprise. The subdivision of the domical surface into sections by *apparent* ribs *apparently* supported by figures (telamones) *apparently* projected from the surface is considered an offence against the fundamental principle of truth in art, and a disregard of the obvious intentions of Wren, who, if he had wished such an architectural subdivision, would have provided for it by contriving actual ribs in the stucco finish, which he so well understood how to use. The treatment of the dome by Sir James Thornhill, probably carrying out the modified scheme of decoration as approved by Wren, and virtually having its figures within and beyond the surface and not *appliqués* upon it, thus *apparently* enlarging the cope instead of diminishing it, is deemed much more in accordance with the architectural conditions. Attention also is drawn to the fact that the scheme, as proposed, does not recognize the great plain surfaces of the drum or tambour of the dome above and below the Whispering Gallery, and, instead of including these important spaces, so much nearer the eye, leaves them bare and subject hereafter to the dangerous chances of adjustment to the finished work above. It is claimed, moreover, that the first experiment should be made, not in the part which demands the highest art and the greatest experience in decorative effects, but in the choir, which presents conditions far more familiar to the artist, and which may consequently be treated with better chances of success, thus educating the hands and eyes of those engaged in the work to a better appreciation of the more difficult parts, especially of the culmination of the decorative problem in the dome. The whole discussion, though covering a very high region of artistic thought, is maintained with vigor and earnestness, indicating that the literary as well as the professional circles in the old country are thoroughly interested and capable of intelligently considering the achievements and due position of the nation in respect to its monumental art.

THE smutty appearance of buildings in London has always been ascribed to the smoke and soot of the metropolis, but those who remember the different degrees of blackness with which St. Paul's is disfigured, without any apparent cause, will not wonder that science has been led to seek, and has apparently found, another explanation of the phenomenon. Investigation showed that buildings in Bath, constructed of a similar oölitic stone, were besmutted in a like manner, while in Wolverhampton, one of the smokiest of English towns, churches and buildings of sandstone were unstained. Clearly, then, if smoke affects masonry at all, its influence must be confined to certain limestones. The discovery of a certain rusticated Italian wall in Cambridge so far out in the country that smoke could not have affected it, which was yet covered with the same blackness which so disfigures the northern side and the lower portions of St. Paul's, led Professor Paley to the belief that smoke was not the cause of the disfigurement, but that it was caused either by some vegetable growth, or by some oxidation that was not understood. Careful investigation by analysis and by the microscope seemed to show that the discoloration was caused by minute lichens, amorphous in form and of extremely low organization, shunning light and warmth and posessing the power of extracting its necessary sustenance from limestone. Of this fact there seems to be no doubt, for those parts of St. Paul's, the best known example of this discoloration, which are exposed to the full light and warmth of the sun's rays still show the original whitish color of the oölitic stone, while those parts on which sunlight never falls, the soffits of the cornices, the under sides of mouldings, the north sides of window jambs and vertical mouldings, and a great part of the north side of the building, are stained and streaked with various shades of blackness. On the north side indeed there are whitish streaks and patches, which observation has shown to coincide with those parts on which the oblique rays of the setting sun fall at certain seasons of the year. If these conclusions are tenable, the proper step to take for protection against this lugubrious para-ite is to discover some way of treating the surface of a building by chemical washes so that the lichen cannot attach itself nor feed upon the stone.

IN accordance with a resolution passed at the last session of Congress, the Heads of the Departments have been generally requested to state what objections, if any, existed to the introduction of the metrical system as obligatory in public and private transactions respectively. It is well known that the system has already been legalized by Act of Congress. The replies which have been received from the several Departments are significant of the very serious obstacles which this proposed reform is destined to encounter. The Navy Department pointed out that as regards naval affairs an obligatory change in this respect would "involve a total loss of all charts and chart plates now in use," the soundings thereon being given in fathoms and feet, as in the case of all English charts. The Postmaster General's objections were not of a serious nature, and did not touch any fundamental points; indeed, it would seem that the gradual introduction of the metrical system could be effected through the Post Office more conveniently and with less disturbance than in any other Department of Government. The State Department maintained that in dealings with foreign countries the disadvantages of the change would, on the whole, outweigh the advantages. In the War Department the change was very strongly opposed, especially by the Quartermaster General, on the ground that it would greatly increase the labor of computation and the chances of error; that it would involve great expense in change of scales, weights, and measures, and great confusion and misunderstanding, until the metrical system had become thoroughly naturalized not only among government officials but among individuals in all parts of the country. He was of opinion that Congress had no power to render the system obligatory in private transactions, and maintained that the meter, not being, as was originally supposed, exactly the ten-millionth part of the quadrant of the meridian of Paris, is "quite as arbitrary and unscientific a standard as the foot or yard." Evidently, however, the Government must make the first practical move in this matter; but, as it seems to us, this move should be made very gradually and in concert with Great Britain, the only important commercial nation besides ourselves which still holds to the old standard. Without such concert, the difficulty of the transition would be more than doubled for either. A simultaneous adoption of the metrical standard in the post offices of the two countries, for example, would apparently introduce it with the least embarrassment and with the best opportunity for rendering its usage and its values familiar to the public.

PAPERS ON PERSPECTIVE.

XII. DISTORTIONS AND CORRECTIONS. — FIGURE PAINTING.

254. IT has been pointed out in the previous paper that the perspectives of circles often look very queer; the ellipses by which they are represented seem unaccountably and even unnaturally inclined, their principal axes slanting in directions difficult to anticipate. The effect of this is particularly objectionable when the circle is horizontal or when it forms the base of a cylinder. The base of a cylin-

der always presents the appearance of an ellipse whose major axis is at right angles with the axis of the cylinder, and it is offensive to find it drawn otherwise, as in perspective often happens.

255. A horizontal circle always appears to the eye as a horizontal ellipse, as an ellipse, that is to say, whose major axis is parallel to the horizon and whose minor axis is perpendicular to it, and it is extremely obnoxious to see it drawn with the axes inclined. This is illustrated in Fig. 58, by the perspective plan of the capital at the top of the figure and that of the base at the bottom. The effect of this would be so disagreeable if the curves of the capital and base were inclined in like manner, that it is customary to introduce a certain *correction*, as it is called, as is done in the figure. These lines are drawn as horizontal ellipses, just as if the object were at the centre of the picture.

256. Fig. 59, *c*, still further illustrates this point, showing that in the column at the centre of the picture the ellipses are horizontal, and that the others are more and more inclined as they are farther removed from it, which looks like an unnatural distortion. In this figure, moreover, the outer columns, which as seen from the station-point at S would look the smallest, since they are farthest from the eye, are on the contrary drawn larger in diameter, an apparent distortion even more offensive than the other. So with the spheres by which the columns are surmounted. The outline of a sphere always looks like a circle; it is not agreeable to find it drawn as an ellipse. But in perspective it must always be an ellipse, unless its centre is just at the centre of the picture; for the perspective representation of the sphere is the section of a right cone with a circular base, and it must always be an ellipse unless the axis of the cone is perpendicular to the plane of the picture.

257. Of course all these distortions disappear when the eye is at the station-point, at a proper distance in front of the picture, opposite the centre C. From that point of view the perspective lines exactly cover and coincide with the outlines of the objects. But practically it is impossible for the spectator always to be exactly at the station-point, and since from every other point circles, cylinders, and spheres appear, in general, to be more or less distorted in the manner we have just seen, it is customary here also to apply corrections. These corrections are palpable violations of the rules of perspective made in order to avoid the disagreeable consequences of deserting the station-point. They consist in drawing all horizontal circles as horizontal ellipses, whether opposite the centre of the picture or not; in always drawing the elliptical representation of the base of a cylinder at right angles with the cylinder itself; and in drawing all spheres as circles. If a row of columns, moreover, is parallel to the picture, they are always made of the same diameter, as if seen in elevation, and if their direction is slightly inclined to the picture care is taken to diminish their width a little as they recede.

258. Fig. 59, *a*, illustrates these corrections, and shows further how the same treatment is sometimes extended to the octagon. The right-hand side of the octagonal figure at the top is drawn steeper than it ought to be, not being directed to its proper vanishing point, in order to remedy the apparent distortion seen in the corresponding figure below.

259. Fig. 59, *a*, shows also the effect of applying to vertical circles and semicircles the same corrections as to horizontal ones. The circular window which in the figure below is drawn in true perspective as an oblique ellipse is here shown as a vertical one, a change which will probably be regarded by most persons as an improvement. The effect of a similar correction in the semicircular-window head beyond is less happy; it makes the nearer half look much too big and obviously throws the imposts, or points where the arch begins, quite out of level.

260. Since these so-called corrections change and generally diminish the apparent size of the circles, cylinders, and spheres to which they are applied, the relation of these objects to other objects is necessarily changed at the same time. In the first place, more of the background has to be shown than can really be seen. In the figure, for example, the openings between the columns are increased, and objects are seen beyond which in point of fact would be hidden. This discrepancy is not very important and in general would hardly be noticed, but the altered relations between these circular figures and other objects in their immediate neighborhood is a more serious matter. The square abacus between the shaft and the sphere that surmounts it looks too big for its place if left without correction, and looks smaller than its fellows if reduced as the sphere and cylinder are. So also when an octagon occurs in immediate connection with a circle. If its shape is adjusted to that of the *corrected* ellipse its want of harmony with the rest of the drawing often becomes painfully apparent. A satisfactory adjustment may sometimes be effected by a compromise, the ellipse being made not quite horizontal and the octagon or square being not quite harmonized with it. But a perfectly satisfactory adjustment is in some of these cases, and notably in the case of a row of columns, almost impossible.

These difficulties are of course greater as the objects in question are further removed from the centre of the picture, and may be diminished or removed altogether by so taking the position of the picture and that of the spectator that the circular object is at or near the centre C.

261. Although the distortions of circular and spherical objects are, in general, the only ones that call loudly for correction, and it is to them alone that correction is systematically applied, it is obvious that a similar distortion must exist for all objects equally distant from the centre of the picture, the so-called distortion consisting in this, that the shape of the object in the drawing is different from the shape which the real object presents to the eye. This is in fact implied in the fundamental principle of perspective, the principle that a perspective drawing will look right from only one point, namely, the station-point. Now as from the station-point every part of the picture except the centre is viewed obliquely, *askance*, as it were, everything *must* be drawn of a different shape from what it appears in order that when the drawing is looked at thus obliquely it may appear as the object itself does when looked at directly. By the very theory of perspective only the object just opposite the eye, seen, along the axis of the picture, just at its centre, is drawn as it looks. Everything else is, so to speak, distorted. The outline given to it is not its real outline, but one which will look like its real outline when seen sideways from the position assigned to the spectator. This distortion is inevitable, and every object in a perspective drawing, except the one at the centre, is always distorted.

262. The disfigurement produced by this does not of course become very obvious, except for circles and spheres, so long as objects are not far removed from the centre, that is to say, so long as the picture is of moderate extent. The limit commonly assigned to a perspective drawing is sixty degrees, that is to say, the width of the picture should not be greater than its distance from the station-point. But this implies that the centre C is in the middle of the picture, which as we have seen is often not the case, and it is better to say that no part of the picture should be distant from the point opposite the eye more than half the distance of the spectator in front of it. But even within this range the distortion even of rectilinear objects is sometimes intolerable, and great caution must always be used in regard to objects situated at the edges of the picture.

263. This limit of sixty degrees is obviously an arbitrary one, and only means that by the time it is reached the distortion begins to be noticeable. It is foolish to say, as is sometimes said, that this is fixed because sixty degrees embrace all that one can see without turning his eyes, or as others say, without turning his head, and that this is accordingly the natural range for a picture. For one has to turn his eyes, more or less, to see directly anything larger than a pinhead, held at arm's length; and he has no need to turn his head to embrace a horizon of ninety degrees. Besides, why should not one turn his head as well as his eyes in looking at a picture as well as in looking at nature? If he is at the station-point, where he ought to be, turning his head cannot make things look wrong, and if he is not there keeping it still will not make them look right.

264. What has been said of cylinders and spheres strictly applies to the human figure, which may be regarded, in a rough way, as a cylinder surmounted by a sphere. Perspective distortion is here even more intolerable than in the case of the more exact geometrical solids, and the need of correction is more imperative.

This is excellently illustrated by the phenomena of the familiar parlor amusement called "Chinese Shadows,' in which a sheet is hung across the middle of a room and the shadows of the performers on one side are thrown upon it for the entertainment of spectators on the other side. A single lamp is used, and it is obvious that all the shadows except the one just opposite the lamp and on a level with it must be more or less distorted as they are more or less removed from this centre. But it is also obvious that if one of the spectators places himself exactly opposite the lamp and as far in front of the screen as the light is behind it, the distorted outlines will be foreshortened into the true shape of the figures on the other side as seen from the place occupied by the flame.

265. A historical picture then, if painted in true perspective, with all its figures so drawn as to present their true aspect to the spectator standing at a given point in front of it, would have all its personages as much out of drawing as are Chinese shadows upon a screen. Fig. 60, which exhibits the results of an experiment with a group of statuary and with half a dozen round balls, illustrates these conclusions.

266. No such picture of course was ever painted, painters always adopting the same course for figures that has been recommended for their geometrical prototypes. Every figure is outlined independently of all the others, and in its natural proportions, just as if it occupied the centre of the picture. In order to see it correctly the spectator has to stand opposite to it, and as he cannot of course stand exactly opposite to more than one figure at a time, it follows that he can never see more than one at a time in correct drawing. All the others are distorted by fore-shortening. But if he is at a distance from the picture this distortion is not noticeable, and when he comes near he confines his attention to the figure nearest his eye.

This is very well illustrated by Raffaelle's famous fresco called the "School of Athens," of which the principal part is shown in Fig. 63. The figures on the extreme right and the spheres which they carry are drawn, as has been pointed out by M. Adhemar, just as if they were in the centre of the picture, opposite the eye. If the spectator were in the middle of the room, one wall of which is occupied by this picture, the chief one of these figures would appear foreshortened, as in Fig. 64, *a*, the sphere looking like an egg on end. One sometimes in the scenery of a theatre sees a round ball on a post present a similar aspect, from the same cause. In order to make the figure appear as it should, to make it assume when seen from the middle of the room, the form intended by the painter, he would have

had to draw it as shown in Fig. 64, *b*, giving the sphere a flattened form, just as in Fig. 59 *c*.

267. If his picture is a large one, the painter often has a difficult task to reconcile his background and accessories, which are drawn according to perspective rule, and calculated to be seen from a single point, with his figures, which utterly violate these rules, and permit and indeed require the spectator to regard them from half a dozen different positions. The background proper may not give much trouble. More of it will be seen between the figures than would be the case in nature, as has been pointed out already in regard to columns, and care must be taken not to use any forms which require the spectator to remain exactly at the station-point; for this he will not do. But that can easily be managed. The chief difficulty is found in fitting the figures into the foreground. If a chair, for instance, occupies one end of the front of the picture and is put into perspective along with the walls and floor, so as to appear correctly from a point opposite the middle of the picture, it must needs look more or less crooked when looked at from a point opposite the end of the picture, and it is no easy matter to make a figure painted from that point of view look as if he were seated comfortably in it. If, moreover, he is to be represented as looking straight across the picture, it is by no means clear whether he should be drawn in profile as he would appear from this point, or with the three-quarter face which he would show from the other.

268. There is even greater difficulty in reconciling the perspective of a floor with the want of perspective of the feet that stand upon it. If a number of persons are shown in the foreground of a picture all facing the same way, it is impossible to make the direction of their feet agree with that of the boards on which they stand. Fig. 61, *a*, shows how the feet of a dramatic company, seen just as the curtain is descending, would be drawn in true perspective, agreeably to perspective plan below. Fig. 62 shows the necessary correction, each pair of feet being drawn just as if it were exactly opposite the spectator. But it is to be noticed that the end man is necessarily represented as standing diagonally across the floor boards.

269. In general, the attitude of the figures at the edge of a large picture is not very clearly defined, and varies as the spectator changes his position. In Guido's "Aurora," for instance, if one stands opposite one end of the picture the figure at the extreme left seems to be marching along the front, and Aurora herself to be looking out of the frame. If he goes to the other end she seems to be looking back at Apollo in the chariot, and the other figure seems to be just coming round the corner, so to speak, from behind his car.

Another difficulty in the perspective of figure subjects is, that if the figures are as large as life everything nearer than they becomes colossal. But this may be avoided, and generally is, by not having anything in particular in front of the principal figures.

270. All the difficulties encountered with the human figure are met in even greater force with figures of animals, except that it is possible for them to be considerably out of drawing without detection. Fig. 65, which is borrowed from the work of M. Thiébault, illustrates at once the extent of the distortion and the difficulty of correcting it.

MODERN PLUMBING. VII.

WATER CLOSETS. I.

ALL the forms of water-closet now in use may be reduced to four types: —

First, the hopper, which is a conical basin with outlet at the bottom, inserted into the mouth of an S-trap.

Second, the valve-closet, properly so called, which consists, in substance, of a hopper with a door closing tightly the outlet, so that a body of water stands in the basin, kept up by the door or valve, until a lever is pulled, which causes the valve to drop and the water and other contents to escape together.

Third, the pan-closet, in which the lower orifice of the basin, instead of being closed by a valve, dips into a pan hinged at one side and filled with water, which is dropped by the action of a lever, and the contents thrown out into the receiver in which the pan works, and thence pass to the drain; and

Fourth, the plunger, or side outlet closet, in which the outlet from the basin runs sideways, far enough to allow it to be closed by a plug working vertically by the side of the basin, which holds the water in the basin until lifted, when the discharge takes place below it.

Hopper or cottage closets are commonly made of cast-iron, enamelled inside, but earthenware is also used, or sometimes an earthenware basin is set in the mouth of a short iron hopper. The earlier shape was nearly conical, but it is found that the action of the flushing water, entering at the side and descending spirally, is more uniform if the sides of the hopper are curved, as in the Philadelphia or the Mott patterns. The lower end of the hopper may be inserted into a lead trap and the joint filled with putty, or it may be bolted to a cast-iron trap by the flange left for the purpose. This is the usual way, and the traps are cast with a removable cover, for cleaning out. An arm is cast on the hopper near the top, into which the supply-pipe is inserted, the joint being made tight with putty, and the water is admitted by any kind of stop-cock or valve. This makes a strong and simple apparatus, suitable for the use of persons who cannot be trusted with the better kinds of water-closet; but the sides get smeared with filth, and the contents of the trap float directly under the orifice of the bowl for hours or often days at a time, so that there is usually more or less smell from it; hence it should be placed in a well-aired situation, or the bowl should be ventilated in some way.

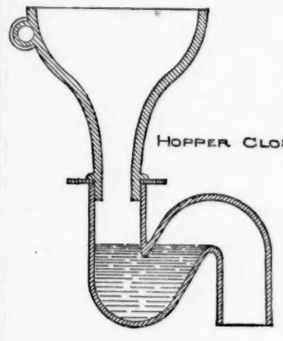


Fig. 1.

Ventilated hopper-closets are made by N. G. Tucker, of Worcester, Mass., R. D. O. Smith, of Washington, D. C., and perhaps by other parties, besides a ventilated hospital hopper by W. S. Carr & Co., of New York. It is not difficult to drill the shell of the ordinary kinds and insert a brass nipple for connecting a pipe for ventilation. Such ventilating pipes are best carried to an independent outlet, and not into a chimney, unless a separate flue is built for them; but they are far less objectionable than a vent pipe from a trap or soil-pipe.

The Tucker closet, which is also made and sold by various dealers in New England under the name of the "Worcester hopper," from the place where it was first introduced and most extensively used, has an earthenware basin inserted into the mouth of a short conical hopper, which has, just above the trap, an arm cast on it for the attachment of a ventilating pipe. The arm is of good size, 1¼ or 1½ inches in diameter, and where the connecting pipe can be carried to the outer air, or into a constantly heated flue, the ventilation is quite effectual, and the cost small.

Fig. 2.

The Smith patent closet also has an earthenware basin, inserted into the top of an iron receiver, something like that of a pan-closet, with a flat top. The lower part of the receiver is tapered like an ordinary hopper, and is set in the same way, while out of the flat cover, by the side of the bowl, springs a ventilating pipe, which is to be connected with a flue or carried to the open air. The foul air ascending from the lower hopper clings to the walls, by a well known property of moving gases, and is thus carried up beyond the orifice of the basin, and having gone so far, it cannot, as long as there is a free escape for it in the same direction by the ventilating pipe, move backwards so as to get into the inner basin. The draught of the ventilating pipe tends to draw air down through the inner basin, and forms a further obstacle to the ascent of vapor. This is also a cheap, strong, and, where an outlet for the ventilating pipe can be had, very excellent apparatus, which should be more widely known. The same principle, of discharging the waste through a conical neck into a receiver ventilated by a pipe which opens into it above the discharging mouth, is applied by the patentee to washbowls, urinals, etc.

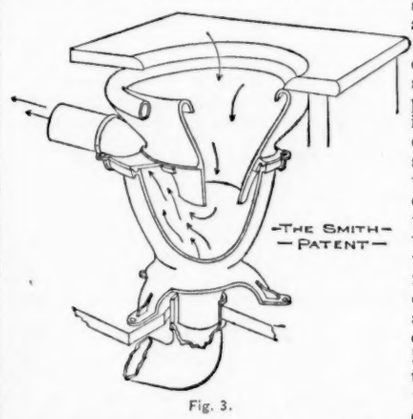


Fig. 3.

Both the Worcester and the Smith closets can be supplied with water in any way desired; either by common or self-closing cocks, or by some automatic apparatus. Still another mode of ventilating a hopper is by Albee's closet ventilator. This consists of a flat pipe of zinc or galvanized iron encircling the top of the bowl, just under the seat, and pierced with holes. At the back a connection is left for a pipe to be carried to a flue or other outlet. This can be easily applied to any old or new closet, hopper, pan, or otherwise, and is very useful in many cases.

Hopper-closets are often supplied with water by means of common stop-cocks, ground or compression, but the ¾ inch pipe, which is the size to which the arm of the basin is usually fitted, will waste water

rapidly if the cock should be left open, and self-closing cocks or valves are generally used, especially the variety known as the "hopper cock," which works with a lever, placed under the seat, and lifted by a brass knob somewhat like the pull of a pan-closet. Valves, as Carr's or Bartholomew's, are often employed, placed under the seat, which is hinged, so that when the seat is pressed down while in use the valve is opened and the water flows, and stops when the weight is removed from the seat. Some valves run for a few minutes only when the seat is relieved of the weight, and some, the best of all, run for a short time while the weight is imposed, and again when it is removed. A valve is made by John H. Stevens of Cambridge, Mass., which is operated by the opening of the closet door.

A useful closet for cold situations, such as occur in churches where the temperature of the whole building may be below freezing five or six days in the week, is a hopper with the outlet carried vertically downward by a length of iron pipe to a trap so far below the surface of the ground as to be out of reach of frost, and supplied with water through a pipe and cock also buried four or five feet beneath the surface, the cock worked with a long spindle like a street hydrant. The vertical part of the pipe, from the cock to the arm of the hopper, will not freeze while the water is running, and the cock must have a tube waste, and be surrounded by loose stones, so that when it is shut off the water in the vertical part of the pipe will drain out and soak away among the stones. An excellent cock for this purpose is Lane's Boston Self-closing Valve. The rod can be ordered of any length, and tubes are made for enclosing the valve and rod to keep the earth away. Where the closet is placed in a shed or basement, the trap may be buried in the same manner, and a supply cock of any kind can be put in the kitchen or other warm place. By either of these methods hoppers will work perfectly where any other kind of water-closet would be useless in cold weather.

Instead of being supplied through the ordinary supply-pipe with its cocks or valves, the hopper may be supplied from a cistern placed over it, with a valve like an inverted cup over the mouth of the pipe which leads from the cistern to the arm of the basin. On pulling a wire or chain attached to one end of a lever over the cistern, the other end of the lever lifts the valve, and the water runs into the hopper with a force and suddenness which have a good effect in urging its contents quickly through the trap, instead of leaving them floating in it, as often happens with a feebler flow. Rhoads's porcelain-seated closet is a hopper supplied in this way from a service cistern. No woodwork is used about this apparatus, as the hopper and trap are all of porcelain, with the top turned over so as to make a comfortable seat, and the whole is screwed to the floor, making a very clean and efficient apparatus. A cistern supply of this kind can easily be arranged to work by the opening of the closet door, out of the reach of mischievous hands.

If a still more effectual mode of automatic flushing is desired, a small cistern holding two or three quarts can be fit ed up in any convenient place, supplied by a ¼ inch pipe, and discharging by a larger pipe into the arm of the basin. The supply is regulated by a stop-cock on the small pipe, so as to fill the cistern once in five or ten minutes. As soon as filled, it is discharged by a valve with a float or some other self-acting arrangement.

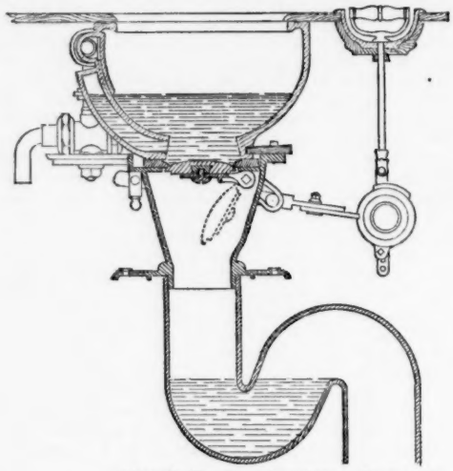
In an automatic cistern just patented by W. G. Rhoads, of Philadelphia (see *American Architect* for July 27, 1878), the outlet pipe forms a siphon in the cistern, and the inlet pipe discharges over a dish so balanced on a pivot that when empty it rests horizontal, but when full it falls forward and empties itself into the cistern. When the cistern is nearly full, the addition of the dishful of water brings into action the siphon, which empties the contents instantly into the hopper. The regular flushing at short intervals obtained by such an apparatus keeps the closet always clean.

A patented closet of this kind is sold by Alfred Ivers, of New York, which is thoroughly made and works extremely well. With the addition of a ventilating pipe, like that of the Smith closet, it would leave little to be desired for use in nurseries or hospitals.

Any apparatus of this kind, however, consumes a large amount of water, a discharge of three quarts every five minutes amounting to over two hundred gallons a day, and where water is costly, or the supply limited, their use is impracticable. Hopper-closets in general require a good deal of water to keep them clean, and in cities an extra charge is made for their use, even when supplied by self-closing cocks.

The name of valve-closet is by common usage applied to any apparatus, whether employing a pan or other cover for closing the lower orifice of the bowl, to which the water is supplied directly through a valve on the supply-pipe, in distinction from the indirect supply by the intervention of a service cistern; but it is convenient here to restrict it to its technical application to those in which the water is held in the basin by a valve, instead of by a plunger or a pan. This variety is common in England and on the Continent, and one English form, the "Bramah" closet, is occasionally imported into this country. The only native example that the writer is acquainted with is the "American Defiance" closet, made by Wm. S. Carr & Co., of New York, which is much used throughout the United States.

In this apparatus the basin, with its overflow in one piece, and the valve are of porcelain. The basin is bolted down to a small iron hopper, just large enough for the valve to work in, and this is enamelled inside. The fan, under which the water enters, and which serves to spread the stream over the sides of the basin, is also of porcelain, made in one piece with the bowl, instead of being formed out of a bit of sheet lead or copper. An S-trap is set below the hopper. This makes a very clean, nice-looking apparatus, all



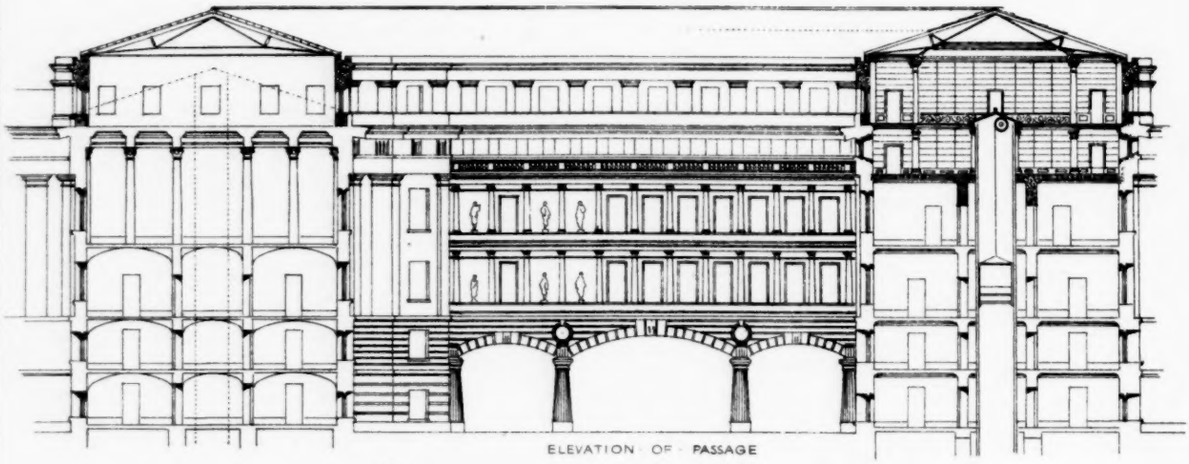
CARR'S PATENT AMERICAN DEFIANCE

Fig. 4.

the visible parts being white porcelain, with no brown streaks from the metal fans and screws, and no exposure of rusty copper pans at the bottom, and when in good order no closet is pleasanter in use; the bowl holds a large quantity of water, so that there is no danger of its sides being fouled, and the opening of the valve throws the whole contents instantly out of sight. In addition, the space between the valve and the trap, which must necessarily be full of the emanations from whatever is in the trap, is small, and, being lined with enamel, the filth passes through it without striking, so that the quantity of gas which is generated or retained in it is insignificant in comparison with the blast of vapor which comes from the container of a pan-closet. Its successful operation, however, depends greatly upon the proper working of the valve. There is nothing to keep the water in the bowl except the upward pressure of the valve against the rubber packing of the outlet at the bottom, and if imperfectly made, or unskilfully put in, the valve may not fit tightly or with sufficient pressure, so that the water can run away, and leave the basin dry. Pieces of paper often get in and hold the valve open, with the same result, so that the apparatus should be used carefully, but it well repays good treatment. The trap should be ventilated, to avoid all possibility of siphonage, which is not unlikely, from the large quantity of water discharged, and would admit a stream of sewer gas into the room around the journals of the valve, even though the basin might be full of water.

These closets, like most of those made in New York, are usually supplied directly by a branch from the main water pipe, through a valve worked by the action of the lever which at the same time drops the valve under the basin; but it is better to employ a service cistern, something like that occasionally used to supply hoppers, and dispense with the valve. The ordinary service cistern for pan and valve closets is a wooden box about two feet long and one foot in height and width, holding some fifteen gallons, and lined with lead or tinned copper. To the under side of the cistern is attached a service-box of heavy sheet lead, usually six-pound. The communication from the cistern to the service-box is through a cistern valve, two inches or so in diameter, which is raised by a lever, connected to the pull of the closet by copper wires and cranks precisely like those used in bell hanging. An air tube leads from the service-box to the top of the cistern, and a ¾ inch or ⅝ inch pipe runs direct to the basin. When the pull is lifted, the valve is depressed and the basin emptied, and at the same time the valve in the cistern is raised and the water runs through the service-box into the basin and out again through the open valve. If the cistern were made without a service-box, as used for hoppers, the flow would cease as soon as the lever was dropped, without the after-flow necessary for filling the basin after the pull is released and the valve closed; but as adapted for pan or valve closets, the raising of the large cistern valve fills the service-box faster than the small pipe to the basin can empty it, and when the cistern valve is dropped by releasing the handle, enough water remains in the service-box to continue the flow until the basin is full. This detached cistern supply can be adapted to any closet, at a cost of a few dollars over the direct valve supply, and is much simpler, stronger, and safer, as well as more perfect in action.

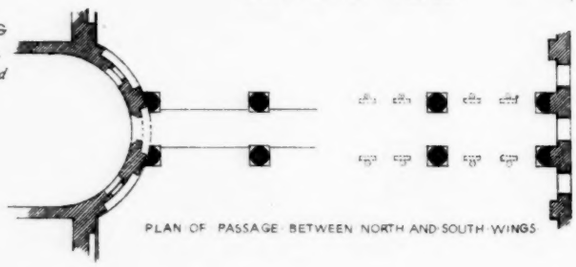
Where a closet is connected directly with the main, it often happens that in case of a failure of water, such as frequently occurs in upper stories, the closet is used, and no water following the raising of the handle, this is left up, so that whenever the water comes again the closet may be flushed. The consequence is that if the water sinks still further in the mains, an almost perfect vacuum is created behind it, and the air rushes in through any open pipe. A



ELEVATION OF PASSAGE

SECTION OF SOUTH WING

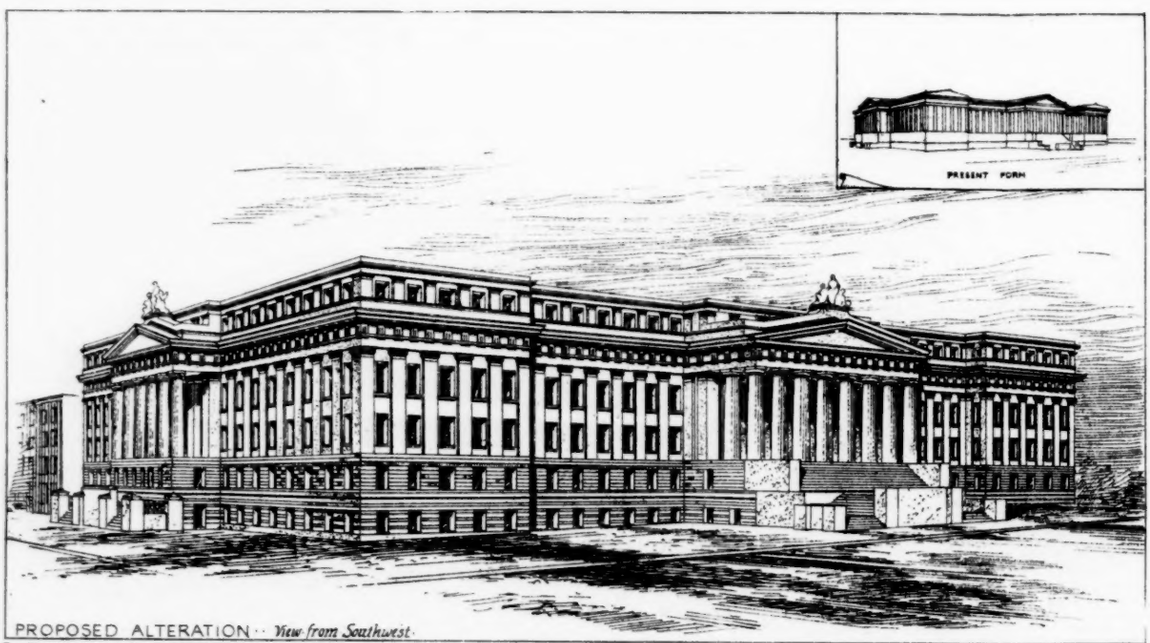
Additional Attic Story proposed over the entire building shown unfinished



PLAN OF PASSAGE BETWEEN NORTH AND SOUTH WINGS

SECTION OF NORTH WING

showing finished Attic Story



PROPOSED ALTERATION. *View from Southwest.*

THE HELIOTYPE PRINTING CO.

—THE PATENT OFFICE, WASHINGTON D.C.—

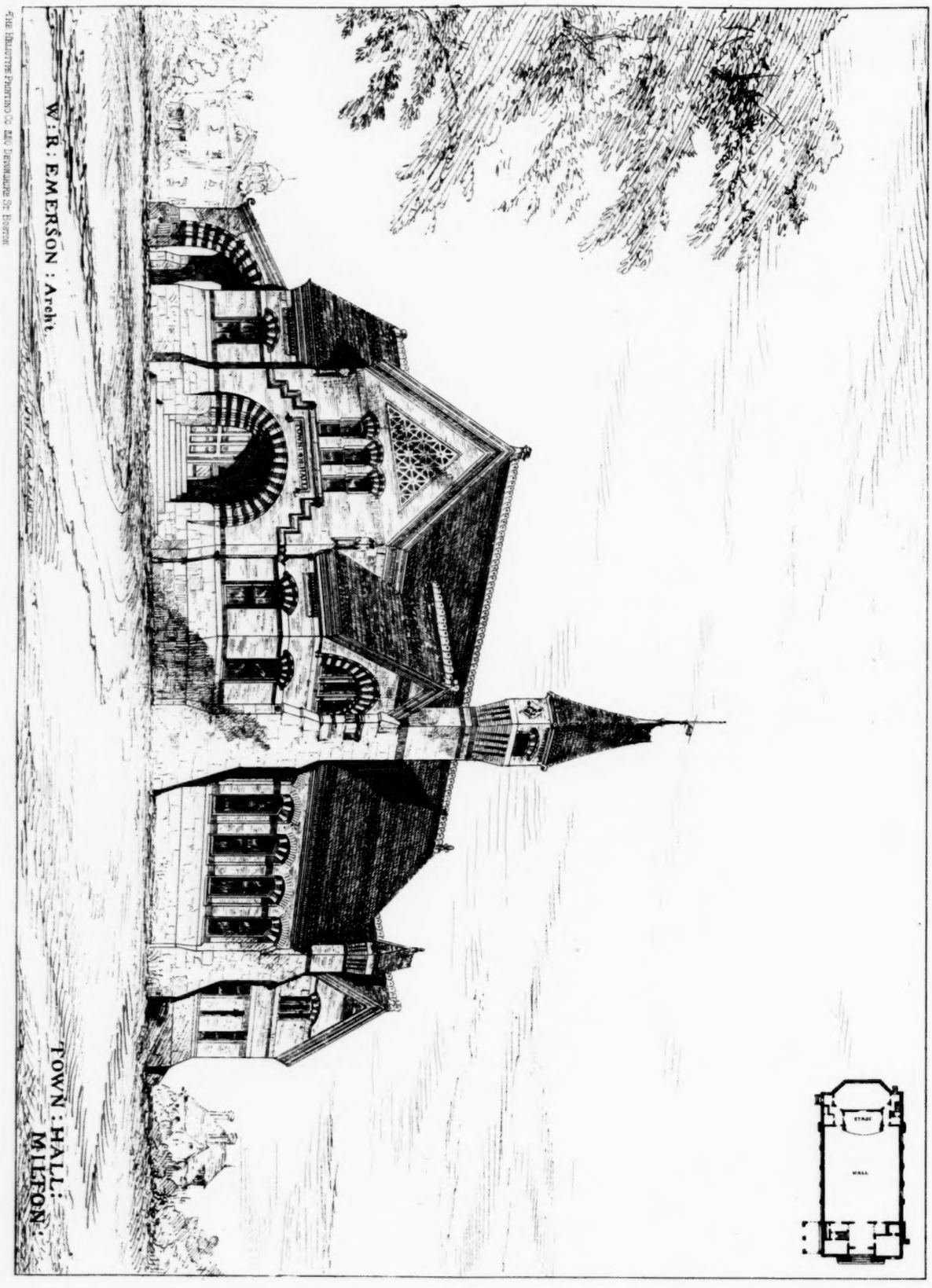

TOWN HALL
MILTON.
W. R. EMERSON: Archt.
HELIOTYPE PRINTING CO. 337 DEVONSHIRE ST. BOSTON

PLATE XIII. DISTORTIONS AND CORRECTIONS.

Fig. 58

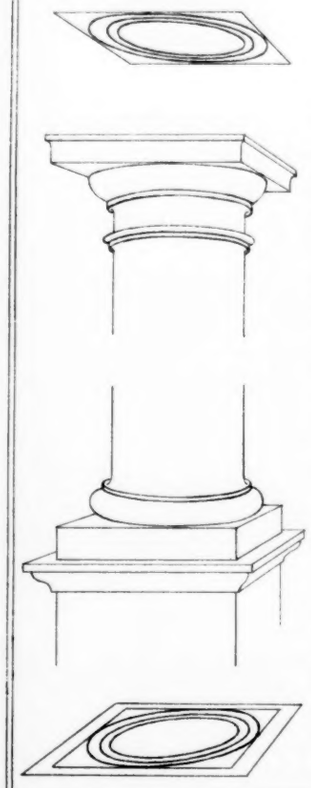
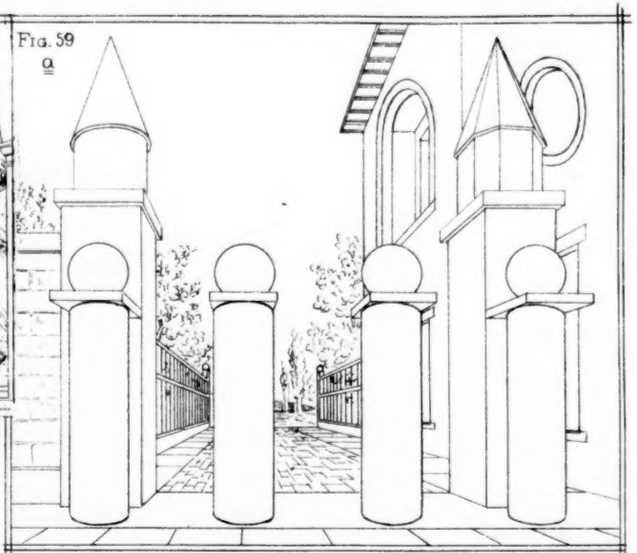


Fig. 63

Fig. 59

a



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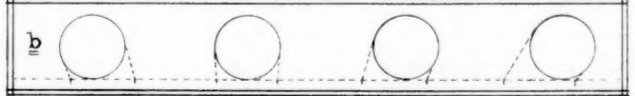


Fig. 62

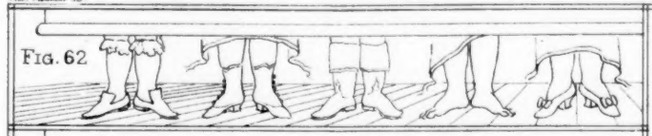
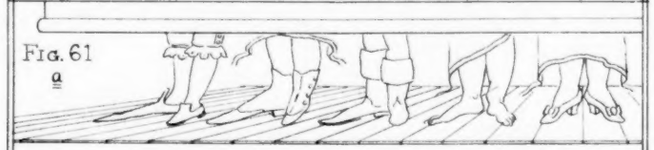


Fig. 61

a



b

Fig. 64 a b

c

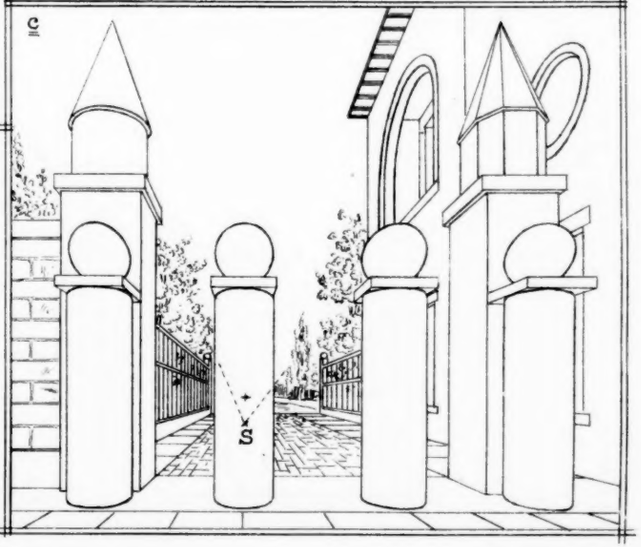


Fig. 60

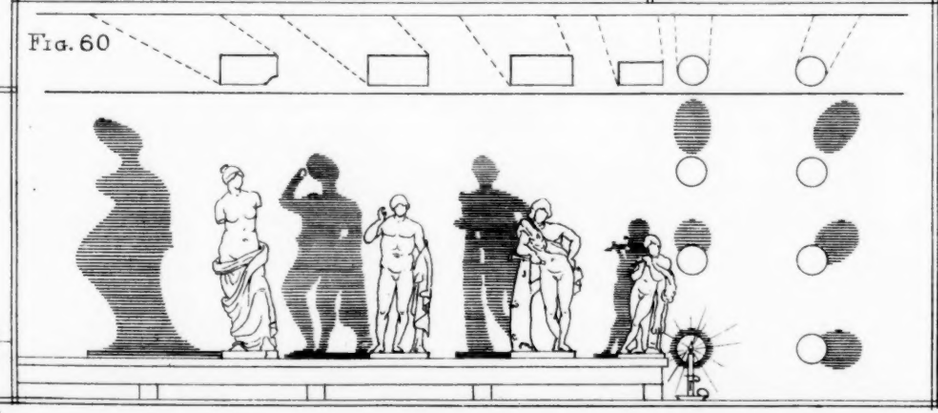
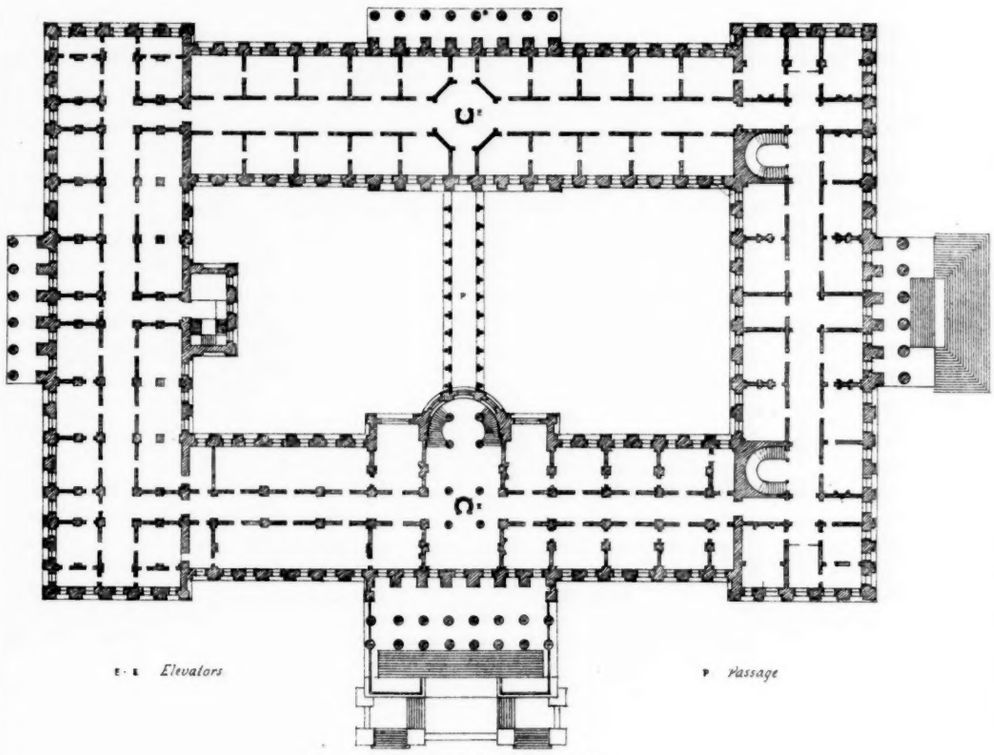
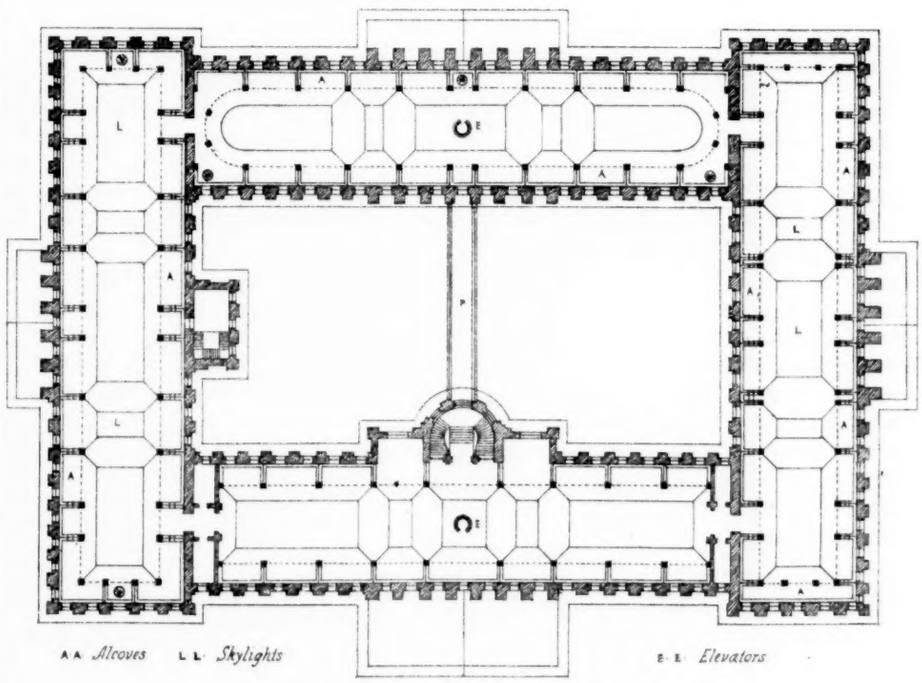


Fig. 65

The Heliotype Printing Co. 220 Devonshire St Boston



PLAN OF SECOND FLOOR



PLAN OF ATTIC AND MODEL ROOM

— THE PATENT OFFICE WASHINGTON D. C. —

closet valve, thus held open, becomes a conduit through which the vapors of the basin, and sometimes particles of its contents, are sucked with great force into the supply pipes of the house. Fatal disease has been traced to this source of contamination.

Another objection to the direct supply valves is that they soon begin to leak, especially if subjected to a varying pressure. They often come enclosed in a little box, with an outlet to be connected to the waste-pipe, and if not so protected, the whole closet is frequently set in a lead safe, so that the leakage of the valve escapes without doing any mischief, but it may become so serious as to waste considerable quantities of water. If the valve, again, is out of order, the closet is useless until a plumber can be sent for to repair it, while with the cistern supply, the breaking of a wire or crank is easily remedied.

Where the cistern supply is employed, care must be taken to adapt the service-box to the size of the closet basin. With a hopper, no service-box is necessary, as no water is needed to remain in the basin; with pan-closets a small one, holding enough to fill the pan, about a quart and a half, is all that is required, while with the "American Defiance," the English "Bramah," or any of the plunger closets, a service-box holding at least two gallons is necessary. Instead of the ordinary rectangular lead service box, with air pipe to prevent the compression of the air from impeding the entrance of the water, a substitute is often made by extending a two or three inch lead pipe down from the cistern valve about two feet, or more, according to the quantity of water needed, and then contracting it to the $\frac{3}{4}$ or $\frac{5}{8}$ inch required for the supply to the basin. This needs no air pipe, and the water runs into the basin with more force than from an ordinary service-box of the same capacity.

OFFICIAL REPORT ON THE PATENT OFFICE COMPETITION.

WASHINGTON, D. C., August 9, 1878.

TO THE HONORABLE CARL SCHURZ, *Secretary of the Interior:*

Sir, — The undersigned, a commission appointed to "examine into, and report upon, the plans submitted for restoring and reconstructing the Patent Office Building," have attended to that duty, and would respectfully report: —

We have received the contributions of thirteen (13) competitors, consisting of one hundred and ten (110) sheets, containing upwards of two hundred and fifty-four (254) drawings, with explanations, and twelve (12) written descriptions. Of these, we were obliged at the outset, to reject one, — the contribution of Mr. J. H. Merrill, — for violation of the rules of competition, in failing to make his contribution anonymous.

Upon a careful consideration of your letter of instructions, together with circulars of June 14, and amendments of June 27, 1878, and accompanying lithographic sheets, upon which architects were invited to base their contributions, we resolved that our recommendations must be favorable "to that competitor, who, taking into account the various requirements and suggestions of circular of June 14, shall have presented, in a single scheme, the most intelligent embodiment of these requirements and suggestions;" also, "that, in determining the merits of the various schemes which have been submitted, we, as experts, must, in justice to all competitors, be governed solely by the requirements of said circular, and accompanying plans."

Having now carefully examined the various drawings and written explanations, we are unanimously of the opinion that the author of the contribution designated thus, <, has "presented the most intelligent embodiment of the requirements and suggestions" of the governing circular, and we recommend the erection upon the walls of the present building of an additional story or "attic," substantially as suggested by this competitor. The adoption of this scheme will give an entire new story of offices, seventy-two (72) in number.

In connection with this, we would recommend the central connecting passage, shown upon sheets Nos. thirteen (13) and fifteen (15) of same competitor; or, instead of this, a building, rectangular in form, about seventy-five (75) feet from north to south, and seventy (70) feet from east to west.

This structure should be tangent to the curve of wall of present stairway of south wing, and connect with north wing by a narrow passage only, thus interfering as little as possible with the light of present building. If made with three (3) finished stories, it will contain, say, eighteen (18) offices; thus the proposed treatment of present building, together with the central structure above described, will furnish a total of ninety (90) new rooms, of average size of present offices.

The new model-room, as proposed, will be of uniform height and style over the whole area of the present building; well arranged for light and air, and capable of architectural treatment in harmony with the present structure, both externally and internally.

As a matter of interior arrangement, we would recommend that the principal gallery be made of somewhat greater width than that shown upon section sheet No. fifteen (15), and placed at a lower level, and that a narrower gallery be placed above this.

Much ingenuity has been displayed by competitors in attempts to secure needed space, while erecting nothing which shall be visible above the present sky-line, except at a considerable distance from the building; but every such attempt develops some serious difficulty, such, for instance, as lack of sufficient height in proposed model-room; absence of light and free circulation of air; interference with light and air of present model-room; lack of proper and convenient means of communication between various portions of building; or, fundamental defect in form, which no management of detail, however clever, can obviate, and which in a room of national importance, cannot be accepted or overlooked.

The question of "design for restoration of the building, substantially as it stood before the fire," is hardly more than one of interior detail. Taking this by itself, we are of the opinion that the author of the contribution designated thus (C S in monogram within a circle) has in sheets No. three (3) and four (4) exhibited the best practical answer to this requirement; but that this arrangement would require modification by a widening of the central longitudinal passage, by reduction of projection of cases, and by the opening of others parallel with this, and nearer the side walls. Also, that the roof, as proposed, is open to serious objection on the ground of comfort, and would require to be supplemented by an interior shell or ceiling, separate from the substance of the roof, and enclosing a sufficient amount of air, with proper ventilating arrangement, for protection against extreme temperatures of summer or winter.

The question of "an entire new roof," has been variously answered by various competitors, but in no case has a plan been suggested, so far superior to others, or to those methods of construction, which are the common property of all skilled builders, as to call for special mention.

Iron roofs, protected by "lime of Tiel," "porous terra-cotta," or "other improved fire-proof materials," are recommended. The lime of Tiel, and porous terra-cotta, are both good materials for the purpose, and capable of adaptation to any form of iron work.

In the design of <, sheet No. fifteen (15), which we have recommended, a common form of roof is indicated, spanning the width of the building.

If our suggestions as to the widening of the galleries in this plan be adopted, the columns may be made to stand over the intersection of the corridor and cross walls, as shown in another scheme of this contributor, (sheet No. nine [9]), in which case the piers or columns may become parts of the construction, and thus divide the bearing of the roof into three comparatively small bays, readily spanned by a single beam.

We would suggest as proper locations for three passenger elevators, the well-holes of the two stairways in eastern wing of present building, and one well-hole of the double stairway of western wing, while the opposite well-hole of the latter affords excellent opportunity for a freight elevator, if desired.

The arrangement of the pilasters of the south portico is such, — the outer one, which must govern the projection of an attic, standing considerably forward of the line of the intermediate ones, — that the south wall of the attic must of necessity be supported over the space below, primarily by transverse iron girders, or their equivalent, resting upon the intermediate pilasters and opposite columns.

Before closing our report, we feel it our duty to call attention to the very dangerous condition of the ceiling and roof of the south portico; these are of wood, furred and plastered upon the under side in each case. A wall of masonry separates the enclosed space from the main model-room, but does not pass through the roof. In this wall are openings leading to the main model-room, as well as into the space between the vaulting and roof of same, which openings are entirely unprotected, being closed merely by doors of wood. Fire might readily be communicated to this space, either through the roof, as in the case of the recent conflagration in west wing, or from below, should any evil-minded person, with sufficient ingenuity, be tempted to take advantage of the present condition of the ceiling of the portico. In carrying out the proposed changes in the main building, this ceiling and roof should be replaced by substantial fire-proof construction.

Very respectfully,

JAMES K. WILSON.
RICHARD M. UPJOHN.
H. W. HARTWELL.

DEPARTMENT OF THE INTERIOR.
WASHINGTON, August 9, 1878.

Messrs. JAMES K. WILSON, R. M. UPJOHN, H. W. HARTWELL, *Present:*

Gentlemen, — I have this day received your report as a Board of experts to pass upon the competitive plans for the restoration and reconstruction of the Patent Office building.

With the submission of this report, your duties in this connection are ended. Delicate as these duties have been, I feel assured that you have faithfully and impartially discharged them, for which please accept the thanks of this Department.

Very sincerely yours,
C. SCHURZ, Secretary.

THE ILLUSTRATIONS.

THE PATENT OFFICE ALTERATIONS, WASHINGTON, D. C.

We here present the designs which show the proposed alterations as submmitted to the committee by the successful competitor, Mr. J. A. Vrydagh. The description of the arrangements will be found in the official report of the committee published herewith.

DESIGN FOR THE TOWN HALL AT MILTON, MASS. MR. W. R. EMERSON, ARCHITECT, BOSTON.

This design was submitted in competition some months since.

STUDY IN PERSPECTIVE. PLATE XII.

See the "Paper on Perspective" in this issue.

VENTILATION OF SEWERS AND DRAINS.[1]

In the following remarks I wish to speak but briefly on the theory of sewer ventilation, and more fully on the practical results of the various systems in operation; for we have nowadays quite a legion of fanciful and unworkable ideas which must early die on account of their incompatibility with existing laws, habits, and conditions of the people.

Given a certain condition, namely, a net work of sewers, and we have sewer-gases. Their nature and formulæ are well known; but we are most concerned with their disease-producing power. That they are capable of generating disease which kills thousands, and prostrates tens of thousands annually, is generally admitted, hence the laudable ingenuity and activity in devising means to keep asunder sewer-gases and human beings.

Such devices have been numerous. Among the first were "traps" of various kinds and names, and from our past experience, we can see that they have literally fulfilled their names; not only "traps," but "man-traps;" for thousands, trusting to their protection, have been deceived, and found them a delusion and a snare.

Then we had the introduction of upright pipes or shafts from the main sewers into the streets, and from w.c.'s up to the housetop; and then came the conflict of opinion as to the density and behavior of sewer-gases, whether they would go up these tubes, or whether they would not require some apparatus to draw them up, without which they would be of no use, and this matter was so unsettled, that each person was left to follow out his own notion as to what was best. Last year the great idea in advance may be expressed in one word, namely, "disconnection," and there can be no doubt of the value and importance which that word implies, and of the myriad dangers which its application would prevent; but, as supplementing or rendering unnecessary all the past schemes, we have what may be termed ventilation by exhaustion, and in a few words I will describe its principle and mechanism. The system is known as "Stott's system." It consists in connecting sewers and drains with the furnaces of steam boilers, or other furnaces with a strong draught. For this purpose the ashes place is inclosed by a door, so as to connect the pipe from the sewer or drain in any convenient manner. In all cases, however, it will be observed that the furnace to which a sewer or drain is connected for the purposes of ventilation, the connection must be so arranged that the furnace must only receive its supply of air to support combustion from such sewer or drain. Consequently, it must be continually exhausting the said sewers and drains of foul gases, which must also pass through the fire and be consumed, or rendered harmless.

After making a number of experiments on the spot with the above system, Dr. Angus Smith wrote the following: —

"Some of the admired plans for ventilating sewers are positively dangerous, others are simply valueless. When the sewer air is brought through the fire, as by your method, it is impossible to imagine that it can escape purification to some extent, and one question of prominent importance is, to what extent?

"It is extremely probable that the destruction of all dangerous substances was complete in such cases as I saw. So far as we know, the substances to be destroyed are not very stable bodies, and are readily decomposed. We may say with safety that the method in question, namely, passing the sewer gases through the great fires of factories, will remove the most dangerous properties, and, if the speed of passage be not too great, the purification will be complete. If sulphureted hydrogen be present it will burn, and the sulphurous acid formed will pass up with the same acid from the coals. If carbonic acid be in excess, it will pass up the chimney with the carbonic acid so constantly formed in the fire. If organic substances, either as germs or more developed living forms be present, they will not endure the heat unless driven through with great rapidity, and if the substances are in a state of putrefaction, that state will be destroyed by a similar heat. The result then is easily known, so far as theory goes; the process if performed well must render the purification complete. So far as practice is concerned, we may be sure that some and even the greater part in many cases of the noxious matters will be thoroughly rendered innocent, whether all or not is a question of size of furnace, amount of air passing, time of passage, and so on.

"The next point to be considered, is to what extent in the sewer is the current of air formed, or we may say, how far will one fire, burning a given amount of fuel, cause a draught in a sewer of a given size. It will require a good deal of experience to answer this question, and that experience can be obtained only by the use of the method in various situations; and I certainly feel justified in recommending that it should be tried and its action carefully examined. The distance to which the draught of air will extend in any sewer depends on the condition of the sewer as well as of the furnace, and I could not pretend to follow the matter into details without abundant experiment. I can say, however, that to cause the currents of air to pass from the interior of our houses into the sewer rather than in a contrary direction, would be to do an incalculable service to a great population, and, indeed, I doubt if there be any one sanitary problem of equal importance before us. It is sufficiently evident that your method solves it to some extent, and I believe it to be equally clear that it is the duty of those, who have the means in their power, to find to what extent the matter is applicable. If the range of action in the sewers be great, the public benefit will be great also. I hope the inquiry will be rigorously made."

The question then is, to what extent will the furnace exhaust the sewer, for it may be admitted that when once the gases and organic bodies are through the fires very little harm can they do.

The first experiment was made at West Vale, near Halifax; the amount of air passing through the fire was measured by the anemometer, and was 980 cubic feet per minute. The question then was, where does this air come from, or how far? The nearest opening was seven yards from the furnace, and the furthest 300 yards away, and between the two points, fifteen other openings or open gullies. Down each of these gullies the anemometer did not register more than about twenty cubic feet, but the fact was abundantly established that, in all of them, remote as well as near, there was a down current. The whole of these gullies were then made up, not absolutely, but in a rough and ready fashion, and the anemometer placed at the extremity of the sewer, when it indicated 490 cubic feet per minute, thus showing that, with well trapped gullies, the effect must extend over a very considerable area.

The next application of the system was to the Halifax Union Poor-house, where some 400 inmates are constantly housed. The guardians in their report say that, since the adoption of Mr. Stott's system in the house, the bad smells, which have taken tons of chloride of lime to disinfect, have been entirely removed; that, although upwards of 150 cases of small-pox and fever have been brought into the infirmaries in a few months, with only four deaths, not one case has occurred among the inmates of any infectious disease; such immunity was never known before the sewers and drains were connected with the boilers.

The Corporation of Halifax then took it up, to see whether such connection with the boilers of mills would remove the complaints of bad smells from certain neighborhoods. The first complaint came from one of the best parts of the town; it was loud and strong, the stench rising into some of the houses at certain times was unbearable; upon investigation, the cause was clearly discovered, namely, the passage into the sewers from several factories where wool was washed of the residual liquor after the soap had been extracted by the addition of sulphuric acid. This liquor, I need not say, was peculiarly offensive. The question then was, shall we stop the business in which this was made, or shall we find a remedy? As our wish was always to interfere as little as possible with business, we decided to connect the sewers with the furnaces of two of the factories; the result has been that we have not had a single complaint since. I ought to add that several of the complaining houses were half a mile from the factories.

Shortly afterwards, in nearly the centre of the town, a similar complaint was made; it was only at certain well-defined times of the day that the stench was so very offensive, and we ascertained that these were the times when the liquid was run into the sewers out of the large cisterns in which it had been stored, so we tried the experiment of running off the liquid at midnight, thinking, of course, to cheat the people, but the effect was that some scores of people had to turn out of bed and out-of-doors too, to escape the noxious effluvia. We then connected the sewer with the boiler of the factory, continuing to use the drains as before, without a single complaint. This extends over a period of four years. A number of similar cases could be added, but the story is the same, namely, complaints which have found their remedy, thorough, effectual and simple, in the connection, on Stott's principle, of the sewers with the furnace of some factory or other furnace having a strong draught.

In 1873, the furnace of Castle Mills, Oldham, was connected with the sewers on Stott's principle, and after giving general satisfaction over a lengthened period, on the recommendation of Dr. Sutton, the Medical Officer of Health, the Corporation decided to have six other connections made in the most complaining parts of the town, and the following were made in 1876: —

	Area of Connecting Pipes.	Number of Revolutions of the Anemometer.	Cubic Feet of Air passing per Minute.
	In. In.		
Albion Mills	22 × 7½	6½	750
Horsedge Mills	23 × 7	13	1,520
Britannia Mills	21 × 6	10½	920
Providence Mills	22 × 8	6½	800
Hope Mills	20 × 8	10	1,090
Castle Mills	15 × 15	4½	700
			5,780

Thus we have for the six mills 5,780 cubic feet of air drawn through the sewers per minute; or for a day of ten and one half hours, 3,641,400 cubic feet. When these had been in operation twelve months, Dr. Sutton gave a report to his committee, in which he says: —

"All are working well except one, the fireman stating that when the apparatus is closed, there is not sufficient draught for the fire, consequently the doors have to be opened. If it had been connected with Gravelwalks drain, as I recommended, instead of the cross-street drain, it would have worked well, the drain in Gravelwalks being much larger. Several of the householders in the neighborhood complain that the offensive smells from

[1] A paper by D. Ainley, M. R. C. S., L. R. C. P., etc., Officer of Health, read before the Society of Arts, and published in the *Journal* of the Society.

the street grids are as bad now as they were twelve months ago. (Query, Because the apparatus is not working?) The inhabitants who resided some time previous to the adoption of this system in the other parts, informed Inspector Walton and myself that the offensive smells were considerably lessened, a result which they principally attributed to Stott's patent; but as Mr. Rawlinson, the Consulting Engineer to the Local Government Board, who visited Oldham previous to my appointment, urged upon the Council the importance of removing the grid traps throughout the town for the purpose of promoting free ventilation, which was carried out, a great portion of the efficacy of Stott's system is counteracted; but even under these circumstances a considerable amount of foul air is conducted from the tributary drains to the furnaces, where the sulphuretted hydrogen, ammonia, and organic compounds pass through the fire, and are rendered innocuous."

In the first week of this month (May) Dr. Sutton made a further inspection of the district partially under Stott's system, and the following is his report: —

HEALTH DEPARTMENT,
TOWN HALL, OLDHAM, May 3, 1878.

Upon inspection, during this week, I find in every case where the same tenants now reside who did so in September, 1877, that they one and all highly appreciate the great improvements of the atmosphere of their houses. Frequently complaints were formerly made to me of their rejecting their food, caused by the fœtid steam being blown into the streets through the grids, and into their houses through the slopstone pipes; and the mortality by simple continued fever and convulsions is materially reduced. I entertain the same opinion which I have always held that, in closely-confined and densely-populated districts, nothing surpasses this method of dealing with sewer-gas. J. M. SUTTON, M. D.

Two years ago the managers of Smedley's establishment, at Matlock, not satisfied with the sanitary condition of the place, applied to Mr. Stott with regard to his invention, with the view of rendering the place as healthy as it was possible to make it. Mr. Stott examined the drainage, and suggested that the whole of the drains should be connected together, and then attached to the boiler on his principle. This was done in a most satisfactory manner, and the result has been all that could be desired.

In conclusion, it will not be out of place to state that this principle is well adapted for the ventilation of steamships, by making the heat of the funnel the exhauster of the foul air below; nothing can possibly be simpler, more effectual, or more economical.

And just as I finish this paper comes the sad news of the explosion on board the mail steamer Sardinia, the facts of which are all well known to you; suffice it to say that, if this principle had been carried out on that steamer, such a catastrophe would have been an absolute impossibility.

CORRESPONDENCE.

A COMBINATION PLAN. — WORK AT THE CATHEDRAL. — THE SAFETY OF SOME PUBLIC BUILDINGS.

NEW YORK.

A SPIRIT of exclusiveness and a desire for privacy have prevented in great measure the carrying out of anything like combination in the designs of private dwellings. We have rows upon rows of brown stone fronts, each house having no closer connection with its neighbors than the party-wall between them. Now and then in the rows of cheap cottages some attempt is made to unify the several buildings, perhaps by carrying the central one up a story higher, or by setting the fronts on different planes, but in general the only architectural device for housing several families in what is really one building is manifested in the apartment house. At the corner of Thirty-third Street and Madison Avenue Mr. R. M. Hunt is to put up a combined dwelling, a real combination too in plan as well as in outward design. At this place Mr. Edgerton L. Winthrop and Mr. Frederic Bronson are the owners of a plot measuring 49×76 feet, the shorter length on the avenue side. Instead of cutting this into a pair of equal parallelograms, a give and-take policy has been followed. Mr. Bronson enters from the avenue at one corner, while Mr. Winthrop enters from the street by a central porticoed doorway. The two houses are in no wise flats, since there is a distinct party-wall rising between them, though this wall is not built in one plane. The dividing line has been built parallel with the Thirty-third Street front, and by giving a little here and a little there where he can well spare it, each house-owner gets in return available space which in houses of the ordinary type would be wholly wasted. The Bronson or avenue entrance leads by the hall to the stairway in the centre of the house, past a large reception room, while the dining-room is at the rear, overlooking the area. The service stairs run up beside the dining-room. The Winthrop house has its reception room on the outer angle of the building, curtailed somewhat by the carrying over of the party-wall to allow space for the Bronson hall. Directly before the entrance is the main stairway, starting at right angles, and leading up by easy runs; back of this, in the space gained by setting back the party-wall, is the servants' stairway; to the left is the dining-room and here the party-wall is on the axis of the plot. The houses are of the English basement pattern, and upon the first floor great fire-proof folding-doors permit a general opening on gala nights. Above the hall of the Winthrop house and extending out in a broad bay over the projecting vestibule is a "boudoir" or morning room, with a fire-place against the blank end of the bay. The chimney arrangement here is peculiar. In the basement is a range fire-place immediately below the main door-step. The flue runs up in the brick sides of the porch. The porch and bay fall back into the main wall on the line of the first chamber floor, and from that point to the roof the chimney-stack is carried on the deep iron box-girder and relieving-arch of brick, while between two of the windows on the mansard roof the chimney top appears, rising apparently out of the main entrance. The construction is good, and security is amply looked after, but the feeling is that guests and visitors enter the house in a sort of horizontal Santa Claus fashion, through the chimney. The exterior is in Philadelphia brick, with Belleville, N. J., stone for window and door finish. No distinction is made on the outside between the two buildings, nor is their interior division line indicated in any way. The finish within is mainly in oak; and at a total cost of over $60,000 the dual building will be a noteworthy one.

At the Roman Catholic Cathedral on Fifth Avenue, it has been decided to build a crypt below the main altar, and workmen are now drilling the opening in the rock bottom upon which the whole church stands. As the stained glass windows are in the nave-aisle and clerestory windows, blasts cannot be used in the building, and the rock is lifted off slowly and laboriously by plugs and wedges. The apse windows have not yet been inserted, nor will they be until the high altar is in position, when they will be designed with special reference to their effect upon the whole. The altar itself has arrived from Italy, ready for erection, and will be put up as soon as the vault and foundation are completed. The crypt will contain twenty-one spaces for bodies, and will be reserved for archbishops and high church dignitaries. The body of Archbishop Hughes, who over twenty years ago originated the project of building the cathedral, will be removed there upon the dedication of the building. Workmen are now busily engaged laying the floor. The ground was cleared down to the rock face, and brick bearing walls at distances of twelve feet were carried up and down the nave and aisles; upon these the wooden beams rest, and the floor will also be of wood. Advantage has been taken of the space below to hang the steam pipes, water and gas pipes, and these may be reached at any time by crawling below the floor. It was at one time intended to have a tile floor, but Cardinal McCloskey feels that such a plan would entail suffering upon the kneeling worshippers, and insists upon the use of wood, except in the lobbies and entrances. The scaffolding has now been entirely removed from the building.

Attention has been called to the several government buildings here by alarmist reports that the Custom House and the Assay Office were in dangerous condition. The Custom House, once the Merchants' Exchange, was built by Rogers, architect, in 1845, and stands to-day without an appreciable crack or sign of settlement. The heavy granite columns and walls were well set, and the building is no whit inferior as a piece of workmanship to anything of a later date. Around its interior courts run galleries of stone supported on granite brackets or corbels, and it is the alleged insecurity of this stone-work that has given rise to the alarming reports. One angle corbel cracked and fell several years ago, owing to some unforeseen imperfection in the stone, and upon this General Steinmetz pointed out the advisability of taking down all the galleries and substituting iron balconies. At the Assay Office it is asserted that the acid fumes and the leakage have excited rust and corrosion in the iron-work, and wooden supports have been inserted, as much to bear any additional weight as to supplement the weakened iron columns. In the Treasury Building proper, a great iron safe is building, 47×28 feet in plan and twelve feet high, for the storing away of the rapidly accumulating silver coin. The safe is now standing at the works of George Damon, Boston. In a few days it will be taken apart and shipped to this city, where it will completely fill the vault arranged for it.

W.

BARTHOLDI'S STATUE OF LIBERTY.

[Paris correspondence of the New York *World*.]

THE statue of Liberty has been before the world as a proposition, if not in bodily shape, at any time since the great Centennial; and its literature of purposes, principles of construction, and measurements is now quite a library in itself. I have no difficulty, therefore, in finding out that the figure in sheer height, clear of all reckoning for its coronet, and for what may be called its footstool, will measure 32 metres, or 104 feet 11⅞ inches. I learn further that the pedestal of granite on which the lady is to stand is, with all due respect for my cicerone, 25 metres high, instead of the 27 named, the 25 metres being equal to 82 feet. Lastly, that if you take the figure from the sole of her classic foot to the extreme end of the torch in her upstretched hand, you will have a height of 42 metres, and if you add this to the 25 already given as the height of the pedestal, you will have a grand total of 67 metres from the surface of the ground at Bedloe to the extreme end of the torch. Now, 67 metres make exactly 219 feet 11½ inches. Can anything more forcibly illustrate the niggardly closeness of the French in a reckoning than their neglect to make it 220 feet?

Let me add but this in the question of size: The statue, as a statue, and quite apart from its pedestal, is to be the biggest thing of its kind; the Colossus of Rhodes would be a mere toy to it, and so would the great Sphinx.

But all this refers only to the work as it will be; now let us consider it as it is. It is being made in pieces, as space and funds permit, and for the first piece made, the fore-arm holding the torch, New Yorkers may see it any day by going to Madison Square. The second part, the head and neck and the beginning of the spacious

breasts (which would be large enough for their function if Liberty were the mother of all the virtues), is now finished and on view on the Exhibition grounds, whence it will be dispatched straight to its ultimate destination. The rest — the trunk, the capacious draperies to cover the lower limbs, and the arm holding the tablet of independence — is all yet to be, and the world will have reason to congratulate itself if it get fully "enlightened" by means of this completed torch-bearer by the year 1881.

Long before the head reached the Champ de Mars my curiosity as to this stupendous specimen of womanhood took me to the workshop in the Rue Chazelle, near the Parc Monceau, where it is being made. The workshop was built wholly and solely for the accommodation of this one inmate and her attendants, some fifty workmen hammering for their lives on sheet copper to complete the toilet of her tresses for the show. The Lilliputians reached her back hair by means of ladders running from stage to stage of a high scaffolding. I mounted the scaffolding with them and stood on the level of her awful eye — some thirty inches from corner to corner — to be ingulfed in her gaze. One of them, a taller manikin than the rest, by something more than the thickness of her thumb nail, from a platform just level with the line of the lips, was tinkering at a line that marks the middle of her brow, and his six feet of height exactly covered the space between the two, and no more. The whole scene abounded in these curiosities of measurement. A number of pigmies of our species crawling about the inside of what appeared to be a vast caldron used in the sugar-refining trade were understood to be really at work on the crown of her head. A smaller caldron, on which two little fellows were busy in a corner, was the tip of her classic nose. Her lips, from dimple to dimple, were as long as my walking-stick, and fifteen people, I was told, might sit around the flame of her torch. . . . . My final care is to see some men of note on art who may consent to give me their judgment on the statue, and first I turn to Auguste Bartholdi, the designer. I find him at his studio in a small street of which the name has really escaped my recollection, though I know well enough which way to turn for it when once I am in the neighborhood of the Gare Montparnasse. Bartholdi is an Alsacian as well as a Frenchman, still young for an artist of his reputation — I should not give him a day more than forty — sincere and winningly bold in manner, of middle height, dark, large-featured, and with a very penetrating glance. He gives you the impression of a man of power, and his works confirm it. He loves to model on a colossal scale — perhaps because this most readily conduces to the simplicity and massiveness of effect which he seeks in art. He is a sculptor of the old, and, as most of us still think, the best school; and the modern Italians, I know, and Carpeaux, I believe, are his bane. He is the sculptor of the Lion of Belfort, which is to be put up in front of the rock-built fortress so heroically defended in the last war, and by that defense preserved to France. This beast is to dwarf all others of his species, including those of Trafalgar Square. In fact, I think he might find room for all four of the latter at a meal in his single person, for the considerably reduced model of him exhibited in the Salon this year is bigger than any one. He measures in his full proportions ninety-one feet ten inches in length, forty-nine feet three inches in height, and he is a superb example of the skill and knowledge which the French have developed of late years in the artistic treatment of his race — a fine vindication of truth and nature against convention, as represented by that monster in every sense, the blubbering Lion of Lucerne. But I must not forget the artist in the work, nor omit to say of the former that he was a very distinguished member of the French jury at the Exhibition of Philadelphia, and that his report on the decorative arts of the United States is one of the best things of the kind.

In my visit to him I found him naturally unwilling to say much about the statue of Liberty. He could only be induced to discuss it by a reference to the general principles on which he had worked. "I have a horror," he said, "of all frippery of detail in sculpture. The forms and effects in that art should be broad, massive, and simple. In my Lion of Belfort, since you press me for an example, I have given only the grand outlines. I have not wasted my time in grooming the mane. I have sought only such a distribution of masses of light and shade as may be likely to tell at the distance from which the thing is to be viewed. I own that the work of what we are pleased to call our modern school pains me by the absence of all endeavor of the kind. The Italians, for instance, as we see them in this exhibition, are positively mean in their imitations of texture in marble work. The pattern of a lady's fan, the lace in her dress, her slippers, and the embroidery of her cambric, are done to the life, and nothing else. All that is but so much taken away from the effect of the essential parts — the form and face. You can hardly conceive how much a figure may lose by such treatment until you see it in some striking example. There is one in New York, a monument in Madison Square, of a great man seated in his chair. The chair is so elaborately wrought that it takes all attention away from the great man. The upholstery is the first thing you look at and the last. Contrast that with another seated figure, the Voltaire of the Théâtre Français, in which I will defy you to ignore, for one moment, the head, the noblest part of the work, the cause and motive of all the rest. Of the statue of Liberty itself I can only say that I have modelled it on these principles, always bearing in mind the place it is to occupy, and consequently not breaking up the work into frivolous detail."

. . . . . .

Mr. Story said: "The Greeks built up their colossal statues most solidly in stone or wood, and on this laid the plates of gold, ivory, or other material that gave the finish to the outward form. I think they were just as right in the mechanical part of the business as we know they were in the artistic. They could dare to do big statues, because they had thought out every question belonging to such work. I am not sure that we have done so; we have too much else to think of nowadays. There are many things to bear in mind before you can rear a statue of a hundred feet with credit to yourself or pleasure to the beholder. The first is that, when you are close to such a statue you cannot see the whole for the bigness of the parts, and that when you are at a distance you lose the parts — the features, the dress, and all the comparative niceties of the modelling. Look at that immense statue on the top of the Capitol at Washington. Try to see all of it, and I will defy you to see more than a great splurge. All detail, even necessary detail, is lost; it is a mere silhouette, a great blot of black metal against the sky. Now the Greeks knew of that difficulty — knew that a colossal statue seen at a distance had a tendency to become a mere outline — and so they took care to make their outline, in so far as possible, tell the whole story. It was pure, varied, and highly illustrative, beautiful in itself, and in some measure independent of the rest of the work. Their figures were in general so modeled as to present a good outline from every point of view. You could not surprise the composition into ugliness by mere cunning in the selection of a stand-point. Will all these conditions be fulfilled in the present statue? I do not even hint that they will not, for it will be impossible to judge of the effect of the colossus without seeing the colossus itself, and, as yet, no man has seen that — not even Bartholdi, who is making it only bit by bit. Mere statuettes, photographs, and other reduced copies, give absolutely no help; we must have the full-sized original in its place. We may all of us then, at our leisure, apply to it the recognized law of art which evidently governed the practice of the first nation of sculptors in the world."

TRANSLATION OF THE INSCRIPTIONS ON CLEOPATRA'S NEEDLE.

Dr. Birch, of the British Museum, has just favored Mr. Dixon with the following revised translation of the hieroglyphical inscriptions on the obelisk: —

"*First Side — Central Line toward East when Erected on Embankment.* — The Horus, lord of the Upper and Lower country, the powerful bull; crowned in Uas or Thebes, the King of the North and South, Ramen Cheper has made his monument to his father, Haremachu, (Horus in the Horizon,) he has set up to him two great obelisks, capped with gold, at the first time of the festivals of thirty years, according to his wish he did it, the son of the Sun Thothmes, (III.,) type of types did it beloved of Haremachu (Horus in the Horizons) ever living.

"*First Side — Left Line.* — The Horus of the Upper and Lower country, the powerful bull, beloved of the Sun, the King of Upper and Lower Egypt, Ra-userma, approved of the Sun, lord of the festivals, like Ptah-Tanen, son of the Sun, Rameses beloved of Amen, a strong bull, like the son of Nu, (Osiris,) whom none can withstand, the lord of the two countries, Ra-user-ma, approved of the Sun, son of the Sun, Ramessu, (II.,) beloved of Amen, giver of life, like the Sun.

"*First Side — Right Line.* — The Horus of the Upper and Lower country, the powerful bull, son of Tum, King of the South and North, lord of diadems, guardian of Egypt, chastiser of foreign countries, son of the Sun Ramessu, (II.,) beloved of Amen, dragging the South to the Mediterranean Sea, the North to the Poles of Heaven, lord of the two countries, Ra-user-ma, approved of the Sun, son of the Sun Ramessu, (II.,) giver of life, like the Sun.

"*Second Side — Central Line, toward Rirer (South) as Erected on Embankment.* — The Horus of the Upper and Lower country. The powerful bull, crowned by Truth. The King of the North and South, Ramen Cheper. The lord of the gods has multiplied to him festivals on the great Persea tree in the midst of the place of the Phœnix (Heliopolis.) He is recognized as his son, a divine chief, his limbs come forth daily as he wishes, the son of the Sun Thothmes (III.,) ruler of An, (Heliopolis,) beloved of Haremacha (Horus in the Horizon.)

"*Second Side — Left Line.* — The Horus of the Upper and Lower country, the powerful bull, beloved of Truth, King of the North and South, Ra-user-ma, approved of the Sun, born of the gods, holding the two lands, (of Egypt,) as the son of the Sun, Ramessu, (II.,) beloved of Amen, making his frontier wherever he wished, who is at rest through his power, the lord of the two countries, Ra-user-ma, approved of the Sun, son of the Sun, Ramessu, beloved of Amen, the lustre of the Sun.

"*Second Side — Right Line.* — The Horus of the Upper and Lower country, the powerful bull, son of the god Chepera, the King of the North and South, Ra-user-ma, approved of the Sun. The golden trait, rich in years, the most powerful, the eyes of mankind behold what he has done, nothing has been said in opposition to the lord of the two countries. Ra-user-ma approved of the Sun, the son of the Sun, Ramessu, (II.,) beloved of Amen, giver of life, like the Sun.

"*Third Side — Central Line, West Side, as Erected on Embankment.* — The Horus lord of the Upper and Lower country, the pow-

erful bull, beloved of Truth, the King of the South and North, Ra-men Cheper. His father Tum has set up to him his great name, placing it in the temple belonging to An, (Heliopolis,) giving him the throne of Seb, the dignity of Cheper, the son of the Sun, Thothmes, (III.) good and true, beloved of the Spirits of An, (Heliopolis,) ever living.

"*Third Side — Right Line.* — The Horus of the Upper and Lower country, the powerful bull, well-beloved of Ra, the King of the South and North, Ra-user-ma, approved of the Sun, lord of festivals of thirty years, like his father Ptah, son of the Sun, Ramessu, (II.,) beloved of men, son of Tum, beloved of his loins; Athor, the goddess, directing the two countries, has given him birth, the lord of the two countries, Ra-user-ma, approved of the Sun, the son of the Sun, Ramessu, (II.,) beloved of men, giver of life, like the Sun.

"*Third Side — Left Line.* — The Horus lord of the two countries, the powerful bull, son of Shu, the King of the South and North, Ra-user-ma, approved of Ra, the lord of diadems, director of Egypt, chastiser of foreign lands, son of the Sun, Ramessu, (II.,) beloved of Amen, bringing his offering daily in the house of his father Tum; not has been done as he did in the house of his father, the lord of the two countries, Ra-user-ma, approved of the Sun, the son of the Sun, Ramessu, (II.,) beloved of Amen, giver of life, like the Sun.

"*Fourth Side and Central Line Toward Road (North) as Erected on Embankment.* — The Horus of the Upper and Lower country, beloved of the god of the tall upper crown, the King of the South and North, Ramen Cheper, making offerings, beloved of the gods, supplying the altar of the spirits of An, (Heliopolis), welcoming their persons at the two times of the year, that he might repose through them with a sound life of hundreds of thousands of years with very numerous festivals of thirty years, the son of the Sun, Thothmes, (III.,) the divine ruler, beloved of Haremachu (Horus in the Horizons) ever living.

"*Fourth Side — Right Line.* — The Horus lord of the Upper and Lower country, the powerful bull, beloved of Ra, the King of the South and North, Ra-user-ma, approved of the Sun, the Sun born of the Gods, holding the countries, the son of the Sun Ramessu, (II.,) beloved of Amen, the strong hand, powerful victor, bull of rulers King of Kings, lord of the two countries, Ra-user-ma, approved of the Sun, son of the Sun, Ramessu, (II.,) beloved of Amen, beloved of Tum, lord of An, (Heliopolis,) giver of life.

"*Fourth Side — Left Line.* — The Horus, the powerful bull, son of Ptah-Tanen, lord of the Upper and Lower country, the King of the South and North, Ra-user-ma, approved of the Sun, the hawk of gold, rich in years, the greatest of victors, the son of the Sun, Ramessu, (II.,) beloved of Amen, leading captive the Rutennu (Syrians) and Peti (Libyans) out of their countries to the seat of the house of his father, lord of the two countries, Ra-user-ma, approved of the Sun, son of the Sun, Ramessu, (II.,) beloved of Amen, beloved of Shu, the great god, like the Sun.

"The scenes on the pyramidion represent the monarch Thothmes III., under the form of a sphynx, with hands offering to the Gods Ra and Atum, the two principal deities of Heliopolis. The offerings are water, wine, milk, and incense. The inscriptions are the names and titles of the deities, the titles of Thothmes III., and the announcement of each of his special gifts." — *London Times.*

QUESTIONS IN SEWER VENTILATION.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — Having lately to re-arrange the drainage of my house, and having become much impressed by the necessity of properly ventilating all drains, I adopted what seemed to be a thorough and rational system. As there were no set-basins or bath-tub wastes to complicate matters, but only one water-closet and the kitchen sink to provide for, the problem was of the simplest. The soil-pipe, untrapped at any point below the water-closet trap, was carried above the roof and covered by a suitable ventilating cowl. That all the gasses generated in the tight cesspool into which all the sewage is carried might not pass through this soil-pipe, and by escaping through unsuspected leaks cause the very evil I was seeking to avoid, I took great care that the cesspool should be well ventilated. This was done by a line of five-inch drain-pipe carried above the roof. Satisfied that the pressure of gas could never be great enough to force the few traps, and that a perfect circulation of air through this small system of pipes was established, I called my work good and thought no more about it.

Time showed that the system was working as it was intended to work: the draught was perfect, the circulation uninterrupted, and the smells probably rejoiced exceedingly at the ease with which they escaped into the upper air from their polluted source below. But as the cesspool filled and matter accumulated in it I became aware, on nights when the air was perfectly dead and quiet, of a sickening and noisome odor, seemingly pervading all the atmosphere, but which when traced to its source was strongest at the base of the five-inch ventilating shaft. I have remedied that evil for the moment by stopping up the opening from the cesspool into the shaft, the result of which is to force the soil-pipe to fulfil, unaided, the dangerous task of ventilating the cesspool. Now what have I done that is wrong, and what shall I do to remedy the evil?

Some of the experts from whom I hope to hear through the columns of your journal will say, undoubtedly, that the trouble is caused by the fact that the top of the ventilating shaft, though rising two or three feet above the roof, is only a few feet from the eaves, and is consequently some twelve feet lower than the ridge-pole. Perhaps it would be better to raise the vent above the highest part of the roof, but the fact that the odor is strongest at the very base of the shaft seems to show that the escaping gas is heavier than the air, and that after being forced to the top by the formation of new gases in the cesspool below, it simply trickles over the edge and flows down the outside. To raise the outlet above the ridge would then only increase the evil by distributing the heavy gas so that, under certain conditions of the atmosphere, it could flow down both slopes of the roof.

If such is the action of sewer-gas under certain circumstances, is not the carrying of the open soil-pipe above the roof about as insanitary a scheme for ventilating public sewers as can well be conceived?

It is very noticeable that the odors arising from a cesspool in which a thick, greasy scum has formed, are less obnoxious, though possibly more unhealthy, than those which rise from a half-filled vault in which no such scum has had time to form.

In some countries it is customary for persons who have been drinking liquor to swallow a small quantity of olive oil, which floating to the top of the contents of the stomach prevents the exhalation of the unpleasant gases arising from mixed and fermenting liquors. Is it probable that the application of a quantity of oil — particularly if made strongly aromatic — to the contents of a cesspool would have a similar result?

Is it possible that too much air is introduced, and that instead of merely providing for the escape of the gases which must form inevitably, I am in reality manufacturing gases most unnecessarily?

I would ask, too, as to the results to be expected from filling with a layer of powdered charcoal, say to half its capacity, that portion of the shaft which, being below ground, is horizontal; but I fear I have asked too much already.

Respectfully, yours, V.

THE STUDIES OF AN ARCHITECT.

[We venture to print, without special permission, the following extract from a letter which we have received from an architect, because we think our readers will see in it, as we do, a very interesting record; and because the manly energy which it displays, and the resolute endeavor of the writer to make thorough work of his training, should be a valuable example to other students, who may find the way of professional schooling a steep one, and may be strongly tempted to content themselves with the least preparation that they think will do instead of working patiently for the greatest they can get. It might also serve to emphasize to the students of this day the advantage they have over their predecessors, in the professional schools that have lately been opened to them, which set the means of professional instruction before them in the most direct and advantageous way, and save them the hard necessity of working without clear direction, and battling alone through all their course. — EDS. AMERICAN ARCHITECT.]

"YOU have been having ideas on the proper qualifications of architects. I will tell you of my education and how it was obtained. I went to work at nine years of age to tend the pitch-pot in a ship-yard, where my father was foreman. I worked three months at that and turning the grind-stone. Then I was taken into the mould-loft and helped to lay down vessels. After being in the yard probably four or five years I had thoroughly mastered the intricacies of ship-building theoretically, and pretty well practically. I studied nights and odd hours, until I could read Latin and Greek quite well. I could read Cæsar and the Anabasis, and translate, as my friend a reverend D. D. said, quite well for a self-educated boy. Then I attended Grammar-school No. 22, in New York, and graduated prepared to enter the Free College of the City of New York; but I did not, I went to work under instructions as a carpenter and stair-builder, passed three years at that, entered college in New Jersey, with no money nor friends; took care of seventeen fires the first winter, and worked at odd hours at my trades; thus I managed to get into the senior year but did not graduate, for my funds gave out. I studied three years with an architect and set up for myself. From the time that I started when nine years of age I have had to take care of myself. I hold this ground: that no men should be allowed to practice as architects unless they have had a practical training. Ship-building is the best schooling for irregular work one can get into, and the carpenter's and stair-builder's trades are the next best; and I would urge every one to take a practical course before entering architecture.

"No boy, however humble his origin, need be illiterate. All can be educated if they have the will and force of character to educate themselves. Pluck, sir, pluck, is what we want in this world. I have gone to bed many a time hungry. A three-cent stamp was an article of luxury that I seldom licked. But those days are gone by; times have changed. I remember when at school blacking the boots of the president at his request; he said when done, 'G., if you ever get to be anything, I shall tell people that you once blacked my boots.' Some of the students stood by; they were of the aristocracy, and jeered at the boot-black: one is in the Tombs at New York, some of the others are the devil knows where. The moral is, treat everybody as gentlemen and ladies, no matter if they have been mean to you, because time changes many things. My experiences I relate to students at my office from time to time. It gives them support and they know what to expect in life, — not much sympathy the poor or struggling receive."

NOTES AND CLIPPINGS.

A Monument to Thomas Jefferson — Those who recall the lively interest that President Jefferson felt for architecture will not be surprised to learn that he left amongst other things a design for his own monument, executed by himself. This design is about to be carried into execution, Congress having at its last session appropriated $5,000 for this purpose, provided the owner of the land at Monticello, where the grave is, would deed to the Government two square rods of land surrounding and including the grave; and would, moreover, grant the public a free right-of-way to the grave over his estate.

The Jersey City Strike. — The laborers at the Jersey City Reservoir, who struck last week, have shown an unpleasant disposition to be riotous. On Friday, August 23d, the sub-contractor appeared on the ground with one hundred Italian workmen, whom he had procured in New York. The strikers who were on hand showed signs of intention to assault the foreigners, but were restrained by Commissioner Semmler, who said he would try to prevent the foreigners from occupying their places. He then went to the contractor and absolutely forbade his employing any one on the works who was not a citizen of Jersey City. To this high-handed and unjustifiable demand the contractor after much discussion was obliged to yield, although, as may be supposed, there was nothing in his contract which limited him in the matter of the domicils or the nationalities of the workmen he might employ.

Crop-Burning. — The rumors that the communists in California were bent on a wholesale destruction of the crops have been fulfilled partly in the neighborhood of St. Jose. The means adopted by the crop-burners to escape detection manifest a certain ingenuity. Investigation showed at each point where a wheat field had been fired a bent wire sticking upright in the ground. One of these wires twisted about with oiled paper, which was connected with a heap of straw, was discovered holding in its coil an extinguished candle, long enough to allow the escape of the incendiary before it should burn down to the oiled paper.

Pennsylvania's Heroes. — The sculptors who up to this time have submitted models for the statues of General Peter Muhlenberg and Robert Fulton, the men whom Pennsylvania is to honor by placing their statues in the "Hall of the Heroes," at Washington, are Howard Roberts, Blanche Nevin, Mr. Kemel, the sculptor of the Catholic Total Abstinence Fountain in Fairmount Park, Philadelphia, Henry M. Gould, of Boston, and Franklin Simmons, the sculptor of the statues of Governor King of Maine, and of Roger Williams, which now stand in the Rotunda.

Graveyard Abuses. — Converts to the rite of cremation will be strengthened in their convictions by the discovery lately made in the Jersey City Cemetery of a large vault, which is said to have contained nearly a thousand corpses in various stages of decomposition, and to which fresh additions were still making. Escape for the noxious gases arising from this decaying mass was provided through holes cut through the bank, and whence issued odors which have for years made the neighborhood unhealthy, and ultimately led to the discovery and abolition of this crying abuse. A somewhat similar case has come to light in Richmond, Penn., where the sexton in charge of the Potter's Field made it a practice to pretend to bury a corpse and, when the mourners had departed, to remove the body to an old tool house, where it remained until enough other bodies had accumulated to make it worth his while to bury them in one and the same pit.

Falling Houses. — Recently two more houses have found that it was easier to tumble into the adjoining excavations for cellars than to stand upright upon nothing. In Washington, on August 19th, the party wall of a house a tthe corner of Ninth and R streets was undermined and fell; and on the 5d of August a house on Mission Street, San Francisco, fell bodily into the freshly dug excavation at its side. The building, a two-story frame house, fell completely over on its side, and was wrecked and twisted out of shape. The three persons who were in the house in bed at the time of the accident fortunately escaped injury.

Manchester Town Hall. — Of the twelve subjects for the mural decoration of the great hall by the chosen artists, Messrs. Madox Brown and F. Shields, the building committee has accepted all but one, and work upon them has begun already. The Parry process will be used in their execution. The subject sselected are: (1.) The Romans in Britain; Agricola builds a fort at Macunium, A. D. 79. (2.) The Saxons' Baptism of Eadwine at Manchester, A. D. 627. (3.) The Danes; After a hard fight they seize the town, A. D. 870. (4.) Origin of manufactures; Establishment of Flemish weavers in Manchester, A. D. 1330. (5.) Early Restoration Movement; John of Gaunt, Duke of Lancaster, defends Wickliffe before the Consistory Court, A. D. 1377. (6.) Commercial Integrity; Weights and measures tested by municipal decree, A. D. 1566. (7.) Science; William Crabtree on Kersal Moor (now part of Manchester) discovers the sun's parallax by observation of the transit of Venus over it, A. D. 1566. (8.) First Blood Drawn in the Civil War; Captain Bradshaw with thirty musketeers beats back Lord Strange's army, 4,500 strong, A. D. 1642. (9.) Education; Humphrey Chetham, merchant, establishes his free school for boys, A. D. 1650. (10.) Jacobite Movement; Prince Charles Edward musters his troops in the Collegiate Churchyard, A. D. 1745. (11.) Cotton; John Kay, inventor of the "fly shuttle," is saved from the fury of the mob in a wool sheet, A. D. 1753. The subject of the twelfth and rejected design, was the "Peterloo Meeting."

Casts of Cleopatra's Needle. — Under the direction of Mr. Bullen, who, eight years ago, was sent out to India by the authorities of the South Kensington Museum to make moulds of the Sanchi Tope gateway, men have been busy of late, in taking moulds of all the faces of the obelisk for the purpose of making a cast of it for the South Kensington Museum. These moulds were to have been of gelatine, but the heat of the weather has been so great as to compel its abandonment in favor of plaster of Paris.

Granite vs. Sandstone. — The action of granite and sandstone under fire was shown lately at the burning of St. Peter's Church, Lamerton, England. The fire is supposed to have caught from a lamp which was placed inside of the organ to regulate the temperature of the instrument. The church itself, which in great part was built of granite, was completely ruined, while the tower, built of a local freestone, — around which the heat of the fire was the greatest, so great indeed that five of the six bells in the belfrey melted where they hung, — was left intact, although the granite window-jambs and sills were destroyed.

The Tour Jean sans Peur, Paris. — *Galignani's Messenger* says that the work of restoring the keep of the Duke of Burgundy's tower in Paris, a view of which was published in the *American Architect* for September 8, 1877, is about completed. The portion of the building referred to forms part of the group of schools created by the City of Paris. It is a square edifice with embattled parapets. During a long time it was divided into small lodgings; in the great hall two stories had been constructed, and the guard-room was turned into a storehouse for ironmongery. Now the whole place is restored to its original appearance, and all the partitions, etc, have disappeared. The staircase of this tower is of particular interest to artists and archæologists.

Baalbec. — A correspondent of the *Pall Mall Gazette* says, "According to Mr. Conder, in his recently published 'Tent Work in Palestine,' the world is in danger of losing one of its wonders. The six remaining columns of the great Temple of the Sun at Baalbec are nodding to their fall. The Turks have already sapped them in seeking for the metal cores run into the joints; every frost adds something to the progress of destruction, and any winter may bring the destruction of three out of the six. These columns, seventy-five feet high, are among the noblest architectural works in the world, and the method of their erection is still unexplained."

Land Transfers in Ancient Babylon. — Mr. W. St. C. Boscawen has discovered among the contract tablets in the British Museum two documents of great interest to geometricians. Attached to two terra-cotta tablets containing deeds of sale of estates near Babylon, Mr. Boscawen found two neatly-drawn plans of the estates in question. The first of these is a deed relating to the sale of some land which took place toward the latter end of the reign of Nebuchadnezzar. It represents an estate of about eight and one half acres in area, and bounded on the northern side by the canal of the goddess Banituo. The names of the owners of all the adjacent lands are given, and the greatest care is taken in giving the dimensions of these plots of land. The whole is divided into three pairs of parallelograms, and check dimensions are taken to test the accuracy of the work. A semicircular portion on the east side is most carefully measured, both radius and circumference being given. The second plan is unfortunately in a mutilated condition, but the remaining portions show the same care and neatness as is found in the perfect one. The deed of sale in this second document is written on the reverse of the tables, and is dated in the reign of Darius Hystaspes. The value of these documents as bases by which to fix both the lunar and area measures in use in Babylonia is very great. Both these documents form portions of the now well-known series of the Ejibi tablets. Mr. Boscawen hopes shortly to publish these documents, accompanied by fac-similes of the plans and translations of the deeds relating to them. — *London Athenæum.*

European Forests. — According to the *Deutsche Industrie Zeitung*, the area still covered by forests in Europe is 739,830,722 acres, which is parted amongst the different countries as follows: —

	Acres.	Per cent of Productive Area
Russia (in Europe)	477,192,922	47.44
Austria	44,486,814	31.05
Sweden	43,532,960	75.72
Finland	35,696,942	79.76
Germany	34,961,274	27.21
Norway	25,424,523	89.93
Spain	21,335,156	26.90
France	20,641,953	15.97
Turkey (in Europe)	13,371,023	19.72
Italy	12,413.956	19.18
Portugal	2,682,176	22.90
Greece	2,235,353	33.99
Switzerland	2,032,598	27.55
Great Britain and Ireland	1,974,320	3.88
Belgium	1,139,959	17.58
Holland	529,748	8.69
Denmark	456,068	6.38

Blackboard Paint. — The *Canadian Mechanics' Magazine* says that the following is a good recipe for blackboard paint: One quart of shellac dissolved in alcohol, three ounces pulverized pumice-stone, two ounces pulverized rottenstone, four ounces lamp-black; mix the last three ingredients together, moisten a portion at a time with a little of the shellac and alcohol, grind as thoroughly as possible with a knife or spatula; after which pour in the remainder of the alcohol, stirring often to prevent settling. One quart will furnish two coats for eighty square feet of blackboard not previously painted. The preparation dries immediately, and the board may be used within an hour, if necessary. No oil should be used.

A Luminous Clock Face. — It is said that a curious clock is about to be introduced by the Ansonia Clock Company of New York. The dial, which to all appearances is of ordinary porcelain, becomes luminous when placed in the dark, so that the hands and figures can be plainly seen, and the time easily distinguished. It is the invention of a French chemist, and is thought to be imperishable.

Durability of Pine Shingles. — It is said that white-pine shingles on the Shaker meeting-house in Canterbury, N. H., put on with wooden pins eighty-six years ago, are still in a good state of preservation.